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RADIONECROSIS: A CLINICAL STUDY.¹

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RADIONECROTIC ulceration is defined as ulceration which appears at any time, or persists after irradiation, the ulcer being characterized by extreme chronicity and the presence of necrotic tissue which shows little immediate tendency to separate. The time factor is important, and allows the subdivision into three groups, which may be termed immediate, subacute and delayed types.

The immediate type is characterized by a persistent ulcer with a slough developing immediately after radiation treatment. It is seen usually after treatment of the ulcerative or infiltrative malignancies.

The subacute type of radionecrotic ulceration appears during the healing stage of an apparently normal reaction, perhaps six to eight weeks after radiation. Arrest of healing suddenly appears, or a healed area may break down. A tough, necrotic slough progressively replaces the central part of the treated area, being at first quite superficial, but later extending more deeply. The usual chronic course of such ulcers is then followed.

The late or delayed type of radionecrotic ulcer occurs in radiation scars. The latency of these scars is a striking feature. Recently, two cases of such ulcers which have appeared in scars caused by X ray therapy delivered up to ten years previously have been seen. Large or repeated treatments with inadequate screens appear to be factors in X ray cases, while practically all the late cases due to radium treatment are associated with β ray therapy in one or other form. An insidious, progressive pathological change in the connective tissue is the primary aetiological factor of ulceration.

¹ Read at the Fifth Australian Cancer Conference, Canberra, April, 1934.

CLINICAL CONSIDERATIONS.

The chronicity of radionecrotic ulcers is the most striking clinical feature, and it is associated with several factors. The sloughing connective tissue shows no tendency to early separation. This is due to inadequate blood supply and lack of phagocytic response. The monocytes and endothelial cells might be expected to clear away the *débris*, and as infection is universally associated with an ulcer area, polymorphonuclear leucocytes might be also expected in the periphery of the necrotic field, but are found, histologically, to be generally deficient.

The line of separation which may appear in senile or diabetic gangrene is never apparent in radionecrotic gangrene. On the other hand, a remarkable resilient thickening of the tissues surrounding the ulcer is regularly present, induration, sufficient in many instances to cause the clinician to suspect residual malignancy. Peripheral hardness, as compared with a thickening due to fibrosis, has been shown to be due to residual or recurrent malignancy, and has been demonstrated in sections following excision of such an ulcer.

The peripheral infiltration must be regarded as a tissue response to irradiation and, to a smaller extent, as an inflammatory effect. It is especially marked in long-standing cases associated with infection.

The edges of an ulcer are irregular, and are not infrequently sharp and craggy. The base is composed according to the stage of the necrotic tissue or atrophic granulations. The central slough is deeply fixed, and shows stranding; the slough may appear semi-liquid, but nevertheless, is firmly anchored. Necrotic bone or cartilage may be present in the ulcer—cartilage is easily removed; but the sequestration of bone is excessively slow. Granulations are of tardy appearance as a result of deficient blood supply, and appear as typical, small, pink, atrophic islets, frequently covered by a tenacious, fibrinous coat. Coalescence of these granulation islets is delayed, and thickly coated fibrinous areas may remain after ultimate separation of the slough. Removal of this fibrin is painful and leaves a poorly bleeding surface, and replacement of the fibrin by granulation is delayed. The epithelial edge might grow slowly beneath the fibrinous surface; but the fibrin more often appears as a barrier to epithelial regeneration.

The presence of a tendon in an ulcer is frequent in lesions of the hand or forearm, and loss of the tendon is usually inevitable. In one case only have I seen granulation, growing at the side of an exposed tendon, ultimately cover that tendon. Separation of the tendon is very slow, and may be assisted by its removal in whole or part.

Sequestration of necrotic fibrous tissue, cartilage or bone, having taken place, healing follows slowly, leaving a scar which remains healthy, and which shows little further tendency to break down.

Pain in the early stages is a clinical feature occasionally of great severity. Two cases of gross methæmoglobinæmia have recently been encountered due to excessive doses of phenacetin and aspirin taken for relief of such pain. Involvement of the mandible is especially liable to cause severe neuralgic

pain on account of the presence of the inferior alveolar nerve in its canal. Neuralgic pain in referred areas may be additional to local dull and continuous pain. In the late stages pain is much less severe, and with the onset of healing processes following separation of sloughs, it finally disappears.

Infection is an invariable secondary complication of necrosis, and the buccal sloughs are extremely offensive. This is due to saprophytic organisms, and the absorption of toxins from the ulcer is a large factor in the frequently present debility, malaise and cachexia of such a patient. The rôle of infection as a primary cause of necrosis will be discussed later.

Hæmorrhage may be a complication; but it occurs less often than might be expected. It occurs in the immediate type of radionecrotic ulcer, and is there due to direct erosion of a deeply seated blood vessel by the ulceration following malignant downgrowth.

Hæmorrhage in the subacute type is very rare. Huge ulcerations have been seen in the tonsillar area, some of which have slowly healed; but never has there been seen a secondary hæmorrhage from this region.

This discussion so far has centred around what might be termed the "deep" type of radionecrotic ulceration. Another type is seen, a "superficial" type characterized by loss of the epithelium over a considerable area; the depth of ulceration is shallow and ceases at the subdermoid or submucous connective tissue layer. The ulcer may be quite extensive; it shows a remarkable tendency to spread, with the formation of a shallow slough which separates fairly quickly and is not characterized by the tenaciousness of the slough of the deep variety. The exposed connective tissue is covered by an atrophic granulation tissue with the inevitable fibrin. Healing, in these types, is slow, and superficial infection is difficult to control. This type has been seen as a "subacute" type on the breast on two or three occasions, and on the lip in a syphilitic subject. As a late manifestation, it has been seen on the neck in the area of superficial scarring and telangiectasis following treatment some years previously with a radium pack.

FACTORS IN RADIONECROSIS.

The discussion will now centre around individual ætiological factors in radionecrosis.

Nature of the Radiation.

It is well recognized that β rays possess a destructive action upon tissues, and excessive dosage will cause immediate necrosis. This has been seen when radon seeds (of 1.5 millicuries initial content and screen equal to 0.3 millimetre of platinum) have been buried extensively through malignant masses; as for example: in secondary epitheliomatous deposits in the neck. It has been the experience of many workers who have used seeds, that necrotic after-effects were frequent.⁽¹⁾ The use of seeds has been abandoned for these reasons. The use of seeds is particularly dangerous near bone or cartilage.

In a case of extensive intrinsic malignancy of the larynx, radon seeds were buried on the deep surface of the mucoperichondrium of the excised thyroid cartilage ala. Necrosis

of remaining adjacent cartilages and superficial muscular and cutaneous tissues followed. Sloughs separated, leaving a laryngeal fistula exposing the opposite side of the larynx; the patient has remained well for three years.

It is probable that the foreign body action of the seeds and the prolonged radiation with the high total dose of both β and γ rays are all factors in the frequency of necrotic effects. Clinicians who still use seeds are inclined to minimize the foreign body effect⁽²⁾; but it has been my experience that the screenage is insufficient, resulting in a subsequent β ray fibrosis which, aided by the presence of the gold seeds, predisposes to necrosis.

Some of the first radon supplied in needle form by the Commonwealth Radium Laboratory was issued in screens equivalent to 0.4 millimetre of platinum, and of two millicuries per centimetre initial intensity. These were used for some time; but it was found that a residual fibrosis with some tendency to telangiectasis persisted in the treated area. In one or two instances of lips treated with these needles, late radionecrotic effects have been observed, which are ascribed largely to the after-effects of the β irradiation.

Nothing definite is known about the action on the tissues of the clinically soft γ rays. (Rays allowed transmission by a screen equal to 0.5 millimetre of platinum and cut out by 0.8 millimetre of platinum.) It is our experience that post-radiation scarring is much less following the routine use of increased (0.8 millimetre) screens; but the amount of radionecrosis in the mouth has not diminished quite as much as was expected.

The dosage of γ rays is probably very important. The adoption of the general working rule that one cubic centimetre of tissue anywhere will stand a dose of one milligramme of radium for seven days (168 hours) is erroneous. Latterly, the tendency has been to reduce the dosage considerably below this figure, especially if there be any possibility of cross-fire augmentation. Over-dosage of γ rays is much more likely to produce the subacute type of radionecrosis, whereas the late types are more frequently seen following β irradiations or inadequately filtered or repeated X ray treatment.

The immediate type of radionecrotic ulcer seen especially in the treatment of ulcerative and indurative lesions of the tongue, is probably a manifestation of γ ray over-dosage. For the last five or six years the above doses have been used; but in the last year, reduction of doses has been effected by reducing the duration of irradiation, with apparent improvement of result. Another factor in this connexion is that of cross-fire, where several long needles are lying in parallel planes. This effect is difficult to estimate clinically, and must be corrected by increased spacing of needles and, to a lesser extent, by reduction of dosage. At the present time it is thought that five-day doses are not as satisfactory as seven days of exposure, and that an initial intensity of two millicuries per centimetre is too high. This intensity has been reduced to 1.5 millicuries per centimetre, thus allowing a dose of 143 millicurie-hours per centimetre in seven days. The differing, overall linear, radiation intensities of radon and radium needles must be taken into account.

It is evident that the doses that have been given are too near the critical limit of connective tissue tolerance, and further study is necessary to re-determine, for individual types of tumours and situations, the maximum amount of radiation necessary effectively to destroy the tumour without risking damage to supporting host stroma.

Infection.

The work of Phemister⁽³⁾ throws considerable light on the rôle of infection in irradiated tissue; but the pathological side of the question cannot be discussed here.

The defences of the body appear to be quite inadequate to cope with an infection on an ulcerated malignant surface, although Fenwick⁽⁴⁾ has pointed out the peculiar absence of infection in rodent ulceration. Treatment of an infected epithelioma causes resolution of the malignant elements, and the defence mechanism during a normal reaction is able to deal with the infection, a clean granulomatous, healing surface resulting. On the other hand, infection during a reaction may be a serious complication because, at this stage, the vascular bed is widely dilated by the paralysis of the vascular contractile cells, and secondly, by the action of the degenerated protein of the malignant cells causing changes in the hydrogen ion content of the tissues and upset of the colloid and crystalloid balance, factors which determine vascular phenomena in inflammation from any cause. If the toxins of infecting organisms are superimposed on a reaction, the result may be a necrosis, as the tissue cells debilitated by the effects of irradiation are unable to withstand the added injury.

Infection very frequently complicates a radionecrotic process, and in most instances, is undoubtedly secondary. In the mouth, a necrotic process must of necessity become infected; but it is difficult to blame infection for the onset of the necrosis.

That it is a primary factor has been well demonstrated during the healing of necks following the application of radium packs. Chronic folliculitis is a complication of such healing, probably due to a nidus of infection in the depth of a sweat gland over the mouth of which the regenerating epithelium has grown. A multilocular chronic pustule results, which spreads locally with resulting peripheral induration, superficial swelling, and epithelial deformity. Opening of the loculi with forceps points usually cures the process. Local areas of necrosis have commenced in such folliculitic foci in several instances, and in one patient two separate areas of necrosis appeared after commencing in this manner, well illustrating the rôle of infection as a primary factor in radionecrosis.

A superficial injury of a radiation scar may allow the entrance and establishment of an infective process which would be at once overcome in normal tissue. The toxins under these circumstances may readily start a necrotic process which may ultimately involve the whole of the radiation scar. On the other hand, it must be admitted that late radionecrosis commences usually as an initial superficial necrosis which progresses in the usual fashion, in spite of the

fact that clinically one is apt to lay the blame on the trauma and infection rather than on the usual late tissue changes leading up to the radionecrosis.

It has been our experience that an infection on a superficial healing reaction area with the *Bacillus pyocyaneus*, is a cause of greatly delayed healing. Subsequent necrosis of the granulation tissue is a further frequent complication, and the slough which forms takes months to separate, the epithelial edge immediately becomes inactive, and a painful, tedious period lies ahead of such a patient.

The Relation of Syphilis to Radionecrosis.

Pathologists have recognized that a diffuse fibrosis is a far more common manifestation of tertiary specific disease than is gumma formation. Syphilitic arteritis is usually associated with such processes. Thus, the fibrosis and the arteritis combine to diminish the blood supply to a part. Normal demands may be adequately met; but under the stress of the reactionary processes subsequent to radium therapy, the efferent blood supply may be inadequate to prevent the inflammatory stasis proceeding to such a degree as to result in local tissue death, that is, immediate radionecrosis.

The syphilitic tongue, in which malignancy so frequently develops, provides frequent examples of this process. Healing is facilitated by strenuous anti-syphilitic treatment, but the fibrosis rarely disappears. An epithelioma arising in a syphilitic tongue is less radio-sensitive than that in a normal tongue, and is more prone to recur locally. Such a recurrence may be of slowly growing type and associated with an irregular necrotic process. In such circumstances further radium treatment is unwise, diathermy excision being the treatment that I have found most successful. In some instances, further treatment may be unwarranted. In several instances I have irradiated lesions which, microscopically, have been reported as malignant, but which have subsequently been proved to be gummata. The pathological difficulties in such a diagnosis are very real, and such mistakes are occasionally inevitable. Gummata are prone to spontaneous degeneration; radiation will increase this process.

A tumour of the thigh in a woman was sectioned and reported to be sarcoma. Radium needles were buried in the tumour area and treatment was followed by immediate necrosis, with the formation of a deep slough. The process seemed out of all proportion to the irradiation dosage, and the Wassermann reaction was then found to be strongly positive. Under anti-syphilitic treatment the sloughing ulcer healed in two or three weeks. A nodule in the forearm of the same patient, regarded primarily as metastatic sarcoma, was uninfluenced by buried radium and retrogressed under the medical treatment.

A flat plaque-like tumour of the left lateral pharyngeal wall with a defined edge and a raised, ulcerated fibrin-covered surface with infiltrated base, on biopsy was reported on as "probably carcinoma". The Wassermann reaction was positive. Radium needles were buried; the necrotic process increased, but healed readily with anti-syphilitic treatment.

An ulcer of rather gummatous appearance was present on the shoulder of a mother of a nurse. The taking of a sample of blood for the Wassermann test was postponed for diplomatic reasons; but on biopsy of the margin "early epithelioma" was reported. Radium needles were then buried, resulting in increased ulceration. The Wassermann reaction was subsequently found to be "strongly positive" and the process readily responded to appropriate therapy.

The diagnosis of a malignant lesion from a gumma or a malignancy on a syphilitic basis occasionally gives great difficulty, and a positive Wassermann reaction does not negative malignancy. In cases of doubt, I rely chiefly on the biopsy findings; far too many cases have been seen where valuable time has been wasted in therapeutic tests of anti-syphilitic treatment. In the absence of response, this test must not be continued for more than two weeks.

The Relation of Tuberculosis to Radionecrosis.

Malignant disease is rarely associated with tuberculosis; but each year brings a few cases with double lesions. Radiation of tuberculous processes by radium needles causes an increase of the ulceration without causing a useful effect.

A tuberculous patient with an indurative process on the upper lip, with a small area of superficial ulceration, was referred to the radium clinic. The appearances were those of an indurative epithelioma of the lip, the typical characters of tuberculous ulceration being absent. No other ulceration was present in the mouth. Macroscopic examination of a biopsy section was regarded as confirming the malignant diagnosis, and radium therapy was then proceeded with. The biopsy report was: "tuberculosis of the lip". The ulceration increased.

An elderly woman was sent with a hypertrophic fungating ulceration of the neck. There was much deep mass formation, not quite typical of malignancy, but clinically regarded as such. No primary growth was found. Radium therapy was instituted and a section of the hypertrophic outgrowth was reported on as "tuberculous tissue". The surrounding induration largely decreased; but in the area of fungation, a chronic ulcer formed which has persisted for over two years. The ulcer passes deeply into the musculature of the neck.

No therapist purposely radiates either pure gummata or tuberculous ulcers with radium. Clinical or pathological judgement has occasionally been in error, and the effects of subsequent radium therapy have been increased ulceration or necrosis.

Type of Malignancy as Related to Radionecrosis.

It is convenient clinically, to classify neoplasms generally into three types, namely: hypertrophic, ulcerating and infiltrating.

The Hypertrophic Type.

The hypertrophic or fungating type is characterized by an outgrowth of the malignant elements, the invasion of host tissue being minimal. It is the general experience that this type of lesion gives the best result following radiation treatment; scarring is of small amount, as tissue levels are readily restored.

The Ulcerating Type.

The ulcerating type of tumour is characterized by a downgrowth of malignant elements into the host tissues, with the subsequent central ulceration largely due to nutritional factors. Considerable destruction of the supporting connective or other subjacent tissues therefore takes place, and complicating sepsis is invariably present.

Adequate needle treatment of such a lesion necessitates deeply buried needles to radiate the tissues containing the advancing edge of the tumour. Thus, when the malignant elements have been overcome, an ulcer remains. Should bone, cartilage or necrotic fibrous tissue be present in the ulcer crater, secondary infection will invariably persist, and should the radiation have been maximal, all the

conditions necessary for the formation of a radionecrotic ulcer are present. The adequacy of the blood supply is probably the determining factor in the uncomplicated case. Vascular degenerations, syphilis, anemias and toxæmias, are all to be considered when healing is delayed following normal doses of radiation. The appearance of the lesion in the healing stage is characteristic: normally a healthy granulation tissue base with fibrinous surface is seen, and the marginal epithelium exhibits rapid regeneration. Delayed healing is characterized by the atrophic nature of the granulation tissue combined with a sharply cut and slightly raised epithelial edge showing no healthily growing margin. Necrotic tissue may be present, or necrosis may later develop.

The Infiltrating Type.

The infiltrating type of malignancy, seen as scirrhous carcinoma of the breast, as the sclerosing type of rodent ulcer, or as the infiltrative epithelioma of the tongue, is particularly liable to post-radiational necrosis. As ulceration is minimal, the hospital patient puts up with this lesion until other serious complications make him seek advice, with the result that these tumours are usually quite extensive. In the mouth, lingual fixation has made feeding difficult, and cachexia appears at an early stage. The fibrosis associated with the neoplasm probably diminishes the blood supply, and the normal phenomena of vascular dilatation associated with the reactionary phases are interfered with; stasis is more likely to occur, and is then followed by tissue death, with the formation of a radionecrotic ulcer.

Radionecrosis is more common in this type of lesion than in any other; in the aged and debilitated it is often wise not to treat extensive neoplasms of this type with buried needles.

Considerations of the Tissues.

The radiotherapist is only too frequently faced with the treatment of a neoplasm situated in close proximity to subjacent bone or cartilage, an intervening pad of connective tissue or muscle being absent. Lesions on the alveoli or the hard palate, or in the neighbourhood of the anterior pillar of the tonsil, immediately arise for consideration. Radionecrotic ulcers with cartilage in the base are seen following the burying of needles either over the cartilage of the nose or ear in the treatment of cutaneous neoplasms, but only when the cartilage or its perichondrium has been infiltrated. Cartilage necrosis never appears in a lesion that is not deeply fixed. Needles are buried in such situations without hesitation. If the cartilage later becomes exposed and chronically infected, it is easily removed, and healing takes place.

However, in the case of bone, the position is more difficult. Recent pathological^{(3) (5)} studies have demonstrated changes in irradiated bone. Clinically, if bone or periosteum be involved in a malignant process, necrosis is inevitable in the presence of possible infection. The rarefied bone which remains following the death of the invading malignant elements invariably becomes secondarily infected if exposed on a surface. Separation of the bone necrosed after

radiation takes months or years—in the case of the mandible one to two years—whereas a necrotic piece of tibia exposed in an ulcer, remaining after treatment of an epithelioma over the subcutaneous surface of the body of the tibia, has shown no signs of separation after three years.

Lesions of the alveolus are seen with subjacent invasion. The only effective treatment in our hands has been to bury needles in the involved area. Radionecrosis of the bone is inevitable, and spicules of bone will be discharged for years afterwards if the malignancy is controlled. Bone regeneration is remarkably slow, and in one case treated four years ago, an osteoporotic area without signs of peripheral regeneration has persisted in the site of the primary growth. On the other hand, in most cases there is a foul ulcer with a deep slough, and healing is very slow, toxæmia adding considerably to the debility of the patient. However, some of these cases do clean up, leaving usually a deep cavity with epithelial lining; but pain is severe in the early stages.

The therapist is more worried, however, by cases in which there is no fixation or peripheral involvement, and in which subsequently the subacute type of radionecrosis develops. Here the mandible becomes exposed in the treated area, a piece of bone becoming exposed in the base of a sloughy-edged ulcer, which persists for months or years. These are cases of probable local γ ray over-dosage for the tissue area concerned.

In areas such as the dorsum of the hand, where poorness of blood supply is acknowledged, the risks of irradiation are well known. A mobile skin of necessity means that vascular connexions are attenuated, and thus radionecrosis is a likely complication. A radionecrotic ulcer of the dorsum of the hand is particularly apt to expose tendons, and in practically every case the tendon will slough. Epitheliomata of the hand and forearm have been frequently seen where widespread invasion has exposed bone, and following radium treatment, an ulcer remains which is chronically infected, the base being complicated by the presence of necrotic tendons, ligaments or bone. Healing in these cases is impossible, and plastic operations have rarely proved successful, sepsis under the flaps usually causing failure. Amputation is generally needed, and in such widespread cases must be considered the primary treatment of choice rather than radium, though conservative radiational measures have occasionally saved parts of a hand. Plastic operations must be undertaken only after the most careful consideration, because blood supply in the radiated areas is invariably restricted, the tissues are weakened and are unable adequately to combat even mild sepsis. Failure of operation may leave the patient in a worse state than formerly.

Consideration of Radiation following Interference with Vascular or Lymphatic Connexions.

The treatment of a malignant recurrence following surgical excision of the primary growth requires especial care on account of the increased malignancy of the recurrence, and from the therapeutic point, on account of the limitation of blood and lymphatic

connexions. An area in which capillary and arteriolar anastomoses were previously relatively free is crossed by a scar, the anastomoses are interfered with, and lymph drainage is impeded, little circulation of any type taking place through the scar. Added to this is the recurrent malignancy infiltrating tissue spaces. Hence the reaction is complicated by added risks of stasis, with the risk of radionecrosis correspondingly increased.

Radionecrosis has been seen quite frequently, even following normal doses of radiation. The recurrence demands effective treatment; but the patient should be informed of the added risks incurred.

Hospital patients with buccal neoplasms invariably have gross pyorrhœa. Removal of infected teeth is necessary, and must be done in stages and with the maximum of care, so that minimal damage may be suffered by the alveolus. Careless removal of teeth with severe lacerations of gums or broken roots, in the presence of infection and the general debility of the patient, is one cause of the occasional necrosis of the alveolus and superjacent tissue following radiation of the tissues in the vicinity.

Malignancy developing in a previously radiated area has a restricted blood supply owing to the collagenous changes in the connective tissues and blood vessels.⁽⁴⁾

Several epitheliomata have been encountered in facial areas showing severe degrees of scarring and telangiectasis following X ray therapy previously given for *lupus erythematosus*. In most of these cases, the epithelioma has been of the hypertrophic type, and healing has taken place readily following buried needles, but where the epithelioma has been of the plaque-like type, healing has been severely delayed.

Finally, recurrent lesions following previous radium treatment must be considered. It is usually said that such lesions are more resistant to a second or third treatment, and it is our experience that this is especially so if β ray or inadequately screened γ ray therapy has been initially used. Peripheral fibrosis of radiational type limits the blood supply and the response to further radiation. Subsequent treatments may be followed by incomplete eradication of the growth, and a breaking down of the treated area, with the development of a radionecrotic ulcer. The treatment of some of these patients and their palliative relief causes considerable worry. It might appear that many of these recurrences were better left untreated; but it is recognized that a simple ulcer, even if chronically infected by basal sequestra or necrotic tissue, is better than a malignant ulcer in which sepsis, hæmorrhage and advance cannot be controlled. Progress of the local growth is arrested; but the subsequent development of metastases may terminate the case. A negative feature of extensive radionecrotic ulcers with infection is the resistance of the patients. Bronchopneumonia is a most uncommon complication, even when the foulest sloughing ulcer exists in a mouth which the patient is quite unable to keep even reasonably clean.

TREATMENT OF RADIONECROTIC ULCERATION.

The management of these cases presents numerous difficult problems on account of the chronicity of the

ulcers with the associated pain while the sloughs are present, the inevitable infection so difficult to control while necrotic tissue remains; and the toxæmia, aggravated in buccal cases by feeding difficulties, either from local pain or limitation of mandibular movements.

Undoubtedly radical treatment is the treatment of choice in late cases; that is, removal of the ulcer-bearing area. This may be done by surgical excision, with immediate or later plastic operation if necessary. But it is to be remembered that the ulcer is in the centre of an irradiated area, and the tissue peripheral to the ulcer has not the vitality of normal tissue. Healing after excision or plastic operation is more liable to complications. Excision must be complete in that the fibrotic basal area of the ulceration must be completely removed. It has been pointed out that a plane of separation may be found between normal subjacent connective tissue and the fibrotic base of the ulcer, and this I have confirmed.

Either the diathermy or the cold knife may be used according to circumstances; but it is necessary completely to remove the basal fibrous layer. I have found this occasionally impossible.

A case of late radionecrosis appeared on the anterior abdominal wall ten years after X ray treatment of a pelvic malignancy. Irregular progressive ulceration with much basal and peripheral induration was present. An area of about thirteen centimetres square was excised with the diathermy knife; but fibrosis was so deep that the external oblique aponeurosis was removed in part. But fibrosis involved the deeper musculature. On account of the risk of weakening the abdominal wall, the fibrosed area of the internal oblique was left. Granulations rapidly grew over the healthy tissues, and healing took place. The fibrotic area became covered with a thick fibrinous coating and, following much dressing, atrophic granulations appeared here and there after some months. Buried skin grafting was then performed, and the ulcer has now become almost completely epithelialized after eight months.

Where the ulcer area has been completely excised, healing usually takes place readily; but care must be taken to see that tension on skin edges is not too great.

Radionecrotic ulcers appear in situations where excision may be impossible. The lack of tissue on the dorsum of the hand, the presence of necrotic tendons or ligaments, and the lack of suitable basal granulation, may make operation unwise. Each case must be considered on its merits; even amputation must be suggested for extensive lesions of the extremities. If excision appears unwise, conservative treatment must be persisted in.

In the mouth most ulcers are of subacute type, and removal of the ulcer is often impossible. Excision of ulcers of the anterior parts of the tongue with the diathermy knife, followed by immediate suture, has given good results in two cases. Where the lesion is situated further back on the dorsum or borders, this proceeding is rarely possible. Coagulative diathermy has been considered, but never tried, as to be of value the coagulation would need to be carried down to healthy tissue, and risks of secondary hæmorrhage would be great from so deep a coagulation. The risks of a chloroform anæsthetic for such a patient must be faced. Recent advances in anæsthesia with intravenous anæsthetics may alter this side of the question. The presence of bone

in an ulcer adds further dangers, as the risk of causing a spreading osteomyelitis is present. Diathermy of tonsillar or lateral pharyngeal ulceration would appear very dangerous. It is possible that the diathermy of necrotic bone might hasten the separation process, and it is apparent that for early types of buccal radionecrosis this method of treatment must be more seriously considered.

Superficial post-radiational areas of delayed healing are frequently encountered. The epithelial edge appears inactive, and the base is covered by fibrin or atrophic granulation. In these cases, or in cases where healthy granulation tissue is present with some delay of healing, skin grafting by the method of Wangenstein⁽⁷⁾ has been used with success. A Thiersch graft, about 2.5 centimetres square, is cut into minute fragments, each about 2.0 millimetres square. The blunt end of a fine probe is pushed obliquely for a short distance into the granulation, and the epithelial implant buried in the probe wound. Implants are spread at a distance of less than one centimetre apart. The wound is dressed with one layer of "Porowax" strapped to the edges and unchanged for a week; superficial normal saline dressings are applied twice daily. These implants grow very readily in normal granulation tissue, and in atrophic areas more slowly. They take below the fibrin-coated areas, the epithelium appearing as a bubble from beneath the fibrin. Healing over atrophic areas is slow, but does take place. This method of skin grafting has many advantages, as ordinary methods of Thiersch grafting are quite impossible in most irradiated areas.

The conservative treatment of radionecrotic ulcers consists in efforts to combat sepsis, to restore the blood circulation, to assist the separation of the slough, and to prevent deformity. Pain must be controlled or alleviated.

The most useful dressings are "Monsol" (diluted to 1 in 200 to 1 in 400), "Flavine" solution (1 in 2,000), hypertonic saline solution, or pure glycerine. "Flavine" is not greatly favoured, as its prolonged use has been found to retard healing. "Monsol" has been proved useful in promoting granulation growth and in stimulating epithelial activity; but in these dilutions it is not adequate to control sepsis if a slough is present.

Heat and hypertonic solutions have been found the most useful dressings. Dressings of pure glycerine are favoured, as the antiseptic action is great, and the hygroscopic action promotes a growth of new blood vessels and granulations. The application of a faced "Plastine" dressing over such a dressing assists the process. When the sloughy or fibrinous area has been replaced by granulation tissue, "Monsol" dressings assist the healing. Hot hypertonic saline baths, or normal saline solution if the former cause pain, are of value between dressings. Applications of "Borocain" or "Percaïne" ointments to the edges relieve the pain. Pieces of slough may be removed with scissors and forceps; splints may be useful in insuring rest and preventing deformities.

In necrosis of superficial type, applications of an ointment containing equal parts of *unguentum hydrargyri ammoniati diluti* and *unguentum zinci*

oxidi have proved very useful in preventing sepsis and promoting healing, especially if combined with a superjacent "Plastine" dressing.

Conservative treatment is usually the only possible treatment in immediate or subacute types of buccal radionecrotic ulcers, and is a tedious and painful process. Mouth washes of eusol, hydrogen peroxide or potassium permanganate are the most useful, and should be used at hourly or half-hourly intervals while sloughing persists. Soft foods only can be taken; a dose of an "A.P.C." mixture three-quarters of an hour to one hour before food assists deglutition. The aid of the dietician should be enlisted to provide suitable nourishment. Limitation of mandibular movements is frequently encountered, either in buccal ulcers or in extensive ulcers of the parotid area, and ankylosis must be resisted by the patient by the use of suitable jaw exercises. Surgical intervention to relieve the condition is usually impracticable, but has occasionally been of value. The removal of one or more teeth—if there are any—may assist feeding.

The pain associated with buccal ulcers is very distressing to the patient, and is apparently of two types—a dull aching continuous pain, and the sharper intermittent neuralgic pains usually in the mandibular nerve distribution. These may be complicated by pains due to involvement of the cervical plexus in metastatic deposits. Pain is alleviated by an "A.P.C." mixture, but morphine may be necessary.

Pain localized to the mandibular division can be relieved in whole or in part, by injection of this nerve with pure alcohol at the *foramen ovale*, the oblique approach from the naso-labial sulcus being used.

Sprays of "Percain" in glycerine (1 in 2,000) may alleviate pain temporarily and allow further mouth toilet. Halitosis is just as distressing to the patient's neighbours as pain is to the patient.

PROGNOSIS.

The occurrence of an immediate or subacute type of radionecrotic ulcer is a complication which will completely incapacitate a patient. In the majority of cases surgical treatment is not applicable, and treatment for the relief of pain and the cleansing of the area with the ultimate object of producing healing, must be instituted. The duration of the ulcer will depend on considerations of the tissue, the presence of subjacent bone, cartilage or other connective tissue, on the general condition of the patient, on the effectiveness of the radiational treatment of the primary growth, and the possibility of extension of pre-existing metastatic deposits or the appearance at a later time of such secondary manifestations.

In the late radionecroses, the prognosis depends on the possibility and efficacy of surgical intervention, which if practicable, should be undertaken with the object of eradicating completely the damaged tissues. The method of repairing the area must depend on the circumstances, an immediate plastic being the operation of choice. This operation will depend on the size and locality of the lesion; complete repair can usually be promised if this be small. It is rarely practicable to perform an immediate reparative

operation where a larger area is concerned, and some method of delayed skin grafting may assist recovery which will be correspondingly prolonged.

The institution of conservative treatment where, for one or another reason, surgical intervention is considered to be unwise, means months of incapacitation. Treatment is directed towards making the ulcer area suitable for a later skin grafting operation, and such cases may drag on for months into years, the lot of the patient being unenviable.

In three cases, deep radionecrotic ulceration of the subacute type has been seen in the neck following application of a radium pack. Sloughing extended deeply, exposing the deep musculature, with subsequent cervical deformities. Sloughs separated slowly, and progressive necrosis took place at the edges of the area. Toxæmia became very severe, and in each case death was primarily due to the necrosis. Radionecrotic ulceration penetrating below the deep cervical fascia appears to be a fatal complication.

In conclusion, I would ask that the term "radium burn" be not used. General practitioners too often class a normal reaction as a burn, and apprehension results. The use of more scientific terms by medical practitioners should be insisted upon.

The subject of radionecrotic ulceration has been clouded in an unwarranted cloak of notoriety due to wide publicity given to certain medico-legal cases, and thoughtful scientific consideration of any organized type has been lacking. Radionecrosis is inevitable in any large radio-therapeutic clinic, partly from the very nature of the cases presenting.

SUMMARY.

1. Radionecrotic ulceration is defined. Three types of ulceration are classified, and the clinical features of each described. Complications are enumerated.

2. Ætiological factors bearing on radionecrotic ulceration are considered in detail with illustrative cases:

- (a) The nature of the radiation is discussed, with special reference to the filtrations and doses used.
- (b) The rôle of infection as a primary cause or a secondary complication is discussed.
- (c) Radionecrotic ulceration following radiation of lesions in syphilitic subjects is discussed.
- (d) The relation of tuberculosis to radionecrosis is considered.
- (e) The relative frequency of occurrence of radionecrotic ulceration in the clinical types of malignancy is discussed.
- (f) Considerations of the tissue irradiated and tissue predisposition to radionecrotic ulceration are brought forward.
- (g) Discussion then centres on radionecrotic ulceration as a complication of interference with vascular or lymphatic connexions. Risks of irradiation of recurrences after surgery, and the treatment of recurrences in previously radiated tissues, are discussed.

3. Problems and methods of treatment are stated.
4. The prognosis is given.
5. Request that the term "radionecrosis" be used in place of the expression "radium burn" is made.

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PATHOLOGICAL MANIFESTATIONS IN RADIONECROSIS.¹

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For the purposes of this discussion radionecrosis may be defined as a massive continuous death of tissues for which radium or hard Röntgen rays are directly responsible.

"Massive death" implies that the tissues concerned die as a whole; there is no differential death of tissue, for example, vascular tissue as distinct from fibrous tissues, malignant tissue apart from its stroma, epithelial as contrasted with areolar tissue or elastic tissue. It is then, the exact opposite of the effect which we wish to obtain from these agents. In short wave-length therapy one aims to produce death of the neoplastic tissue or granulation tissue, while leaving the normal tissues sufficiently healthy to heal the area concerned by fibrous, elastic, vascular and, if necessary, epithelial tissue. The ideal result is a cyto-caustic action in contrast to a histiocautic action.

¹ Read at the Fifth Australian Cancer Conference, Canberra, April, 1934.

Radiation will in given circumstances produce this effect, but in no circumstance can we consider that a therapeutic dose is without effect on these essential reparative tissues. The therapeutic dose may produce rapid degeneration of the normal as well as the abnormal tissue, that is, the normal "reaction" is not self-limited to a degeneration of the abnormal tissue with subsequent repair, but the neoplasm and the stroma, and maybe surrounding tissues, progressively die in a continuous manner. This type of necrosis is called acute or immediate. In other cases we find that after the reaction has taken place normally and the ulcer formed appears as though normal repair will take place, the whole processes become stationary or further breaking down takes place. This type of necrosis is termed subacute or delayed. A more unusual occurrence is the breaking down of a previously healed lesion. This type of necrosis is referred to as late or remote.

Acute Necrosis.

The findings in cases of acute necrosis are typical of tissue degeneration elsewhere with loss of cell and nuclear structure. In the only case of this type which I have had to examine there was a poor leucocytic response to the degenerating tissue. Massive destruction of the neoplasm over the lingual artery leads to secondary hæmorrhage. The tissues concerned in this progressive breakdown were epithelioma, the stroma of this tumour, muscle and vascular tissue; this despite the fact that radium had been implanted only eight days previously.

This specimen raises the question of the differential sensitivity of tissues to short wavelengths and what factors modify the normal differential sensitivity. It will be agreed that the radio-sensitivity of neoplasms closely follows that of the normal tissue of origin, which may be thus grouped in decreasing order of sensitivity:⁽¹⁾

- (a) Lymphoid cells.
- (b) Basal cells of salivary glands.
- (c) Polymorphonuclear leucocytes.
- (d) Epithelial cells:
 - (i) Spermatogonia.
 - (ii) Basal epithelium of skin, mucous membrane and certain organs such as stomach and small intestine.
 - (iii) Alveolar epithelium of lungs and bile ducts.
 - (iv) Epithelium of tubules of kidney.
- (e) Endothelium of blood vessels, pleura, peritoneum.
- (f) Connective tissue cells.
- (g) Muscle cells.
- (h) Bone cells.
- (i) Nerve cells.

There is no satisfactory evidence that increased rate of mitosis in tumours has any fundamental effect in increasing the sensitivity derived by the neoplasm from its parent cell. The parotid tumour with no mitosis evident is very much more sensitive than the rapidly dividing melanoma (the benign melanoma is often more sensitive than the mitosing one). The Bergonié Tribondeau⁽²⁾ law sought to apply a general statement of the behaviour of cells

under radiation from observation of the extremely special cells of the rat's testis. In the same year Regaud and Blanc⁽³⁾ came to much the same conclusion, that the less differentiated a cell the longer its mitosis, and the more frequent its mitosis the more radio-sensitive it is. They note, however, that cells differ in sensitivity even though the factors of mitosis may be constant.

If we take the above statement as setting out approximately the radio-sensitivity of the tumours and normal tissues, then theoretically we could treat a tumour with an origin from groups (a) to (d) without necrosis of the vascular or connective or bony tissues.

The vascular and connective tissues are the other tissues concerned. The optimum reaction of these would be normal or decreased sensitivity. We know of no method of decreasing their sensitivity. Factors which increase it are necessarily favourable to radionecrosis. Previous irradiation greatly reduces the dose necessary to cause breakdown of these tissues. Relative scantiness of stroma will lead to a massive breakdown of the whole tumour mass. Even if there is sufficient stroma to form a basis of repair, it is essential that the tissues be healthy. An underlying syphilitic lesion with endarteritis, collections of radio-sensitive small round cells, granulation tissue, sometimes gummatous necrosis greatly augment the massiveness of the breakdown process. The occurrence of arteriolar sclerosis as part of a general condition increases the tendency to stroma breakdown. The presence of "latent" uræmia or diabetes is also apparently a factor in the production of these manifestations.

Factors of health of the stroma and the general condition of the patient lead to breakdown.

There are, however, certain local considerations of extreme importance. Tissue subjected to radiation has a reduced reaction to infection. Invasion readily takes place, with death of tissue as a frequent occurrence. This is less noticeable where complete asepsis may be maintained than in the mouth, where the puncture wounds provide a ready path of infection. The actual invading organisms have not, so far as I am aware, been investigated. It is quite possible that the radium acts as a mild disinfectant while *in situ*, but certainly infection takes place. The saprophytic invasion of the slough is probably a final stage after death of the tissue has taken place.

The anatomical arrangement of the part is not without significance. The skin over the back of the hand and subcutaneous surface of the tibia presents an extremely poor neuro-vascular reaction in the aged. In these sites necrosis of the tissues readily takes place.

The proximity of bones, tendons, cartilage and fasciæ is very important. Phemister⁽⁵⁾ has shown that, even though bone has been killed by irradiation, if it is kept in normal function and free of infection, then the dead bone acts much as a bone

graft. Osteoclasts of the dead bone takes place and new bone is built up on this scaffold. If, however, injury, loss of function or infection takes place, that portion of the bone affected is sequestered. A very slow separation of this sequestrum is the rule. This is associated with a replacement of the marrow, yellow or red, by a very degenerated fibrous and myxomatous tissue in which phagocytosis takes place very slowly.⁽⁶⁾ There is an altered texture of the bone, which is more than normally hard and brittle, even though decalcification has taken place.⁽⁷⁾ Similar findings hold with regard to tendons and cartilage. If conditions are aseptic, a slow repair will take place; if any element of sepsis is present, a casting-off occurs. This is a very much quicker process than in the case of bone. The sectional area to be digested is usually less; there is no fibrosing tenacious marrow to restrain the separation.

These observations were made on tissues subjected to excessive doses. To determine whether any similar changes took place in the use of therapeutic doses, radon needles, 2.0 millicurie strength per centimetre of length, 2.0 centimetres long, and with 0.5 and 0.8 millimetre of platinum screenage, were implanted under the skin of the forelimbs and the skin of the ears of two dogs, full asepsis being used. They were left *in situ* for six days and then removed. The ears were examined three weeks later, the bones of the forelimbs eight weeks later. These times were chosen to allow structural rather than molecular changes to develop. In the ears the areolar and epithelial tissues show characteristic radiation reaction. The cartilage shows destruction of the perichondrium, some degeneration of the chondrocytes, and a commencing granulation tissue invasion of the cartilage (Figure I).

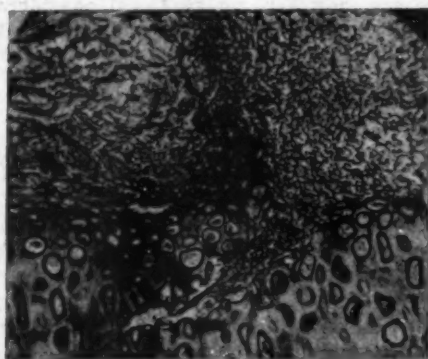


FIGURE I.

Section of dog's ear twenty-one days after irradiation. The perichondrium and some of the chondrocytes have degenerated. Fragmentation of the cartilage is taking place. $\times 80$.

The bones show a subperiosteal rarefaction with a granulation tissue formation (Figure II). These changes were present whether the equivalent of 0.5 millimetre of platinum in nickel or 0.8 millimetre of platinum in gold was used, but in the latter

case the change had to be looked for carefully and was very much less than in the former.

These changes are definite evidence of superficial destruction of the bone and cartilage. Repair was taking place. Phemister's work indicates that had infection occurred, then a flake-like sequestration would have resulted.



FIGURE II.

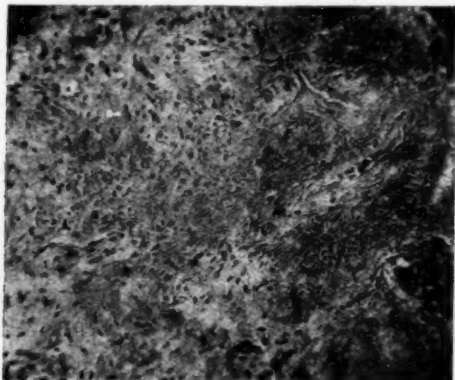
Section of radius of dog irradiated seven weeks previously. There is subperiosteal granulation tissue and cortical rarefaction. $\times 80$.

Another major consideration where the tissue irradiated is close to bone is the necrosis of muscle tissue in the vicinity. Mottram⁽⁸⁾ showed that when radon in screened seeds was implanted aseptically under the scapulae of rabbits, the necrosis produced in the muscle followed the general contour of the bone. He ascribed this to secondary radiation from the bone, but as Hernamann-Johnson pointed out in the discussion of Mottram's paper, this could not possibly be the case. Such a secondary radiation would be but a very small proportion of the radiation in the field and would be of extreme softness, so that it could not penetrate the depth of muscle, which is illustrated as necrosed. Despite the fallacy of his explanation of the phenomenon, it is of very material importance that such an effect is produced by irradiation of muscle in the neighbourhood of bone.

These manifestations of necrosis of muscle near bone and necrosis of irradiated bone if infection takes place are constantly occurring in treatment of intraoral tumours. Sloughing of a whole muscle which lies alongside bone, for example, the *musculus pterygoideus internus* or the *musculus tensor veli palatini*, leaving a roughened dead flake of bone in the base of the ulcer, are seen in some cases. In most the area of slough is not so extensive, but the essential basic principles are the same.

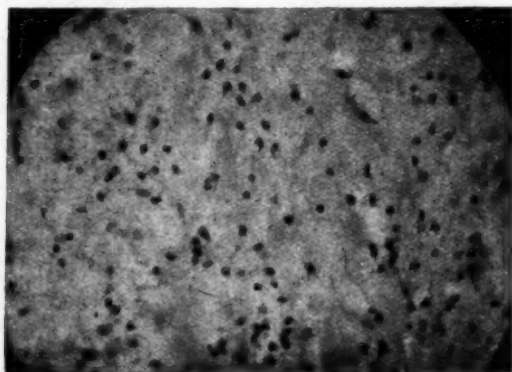
Subacute Necrosis.

In subacute necrosis a failure of repair is the underlying factor. It is a common consequence of acute necrosis, but frequently occurs in cases which have had a normal reaction and in which healing is expected. Any of the conditions affecting healing by the stroma which have been mentioned above may be concerned in these cases. The most out-

**FIGURE III.**

Section near surface of radionecrotic ulcer. The gradual change of the hyaline fibrous tissue into the structureless slough is shown. $\times 80$.

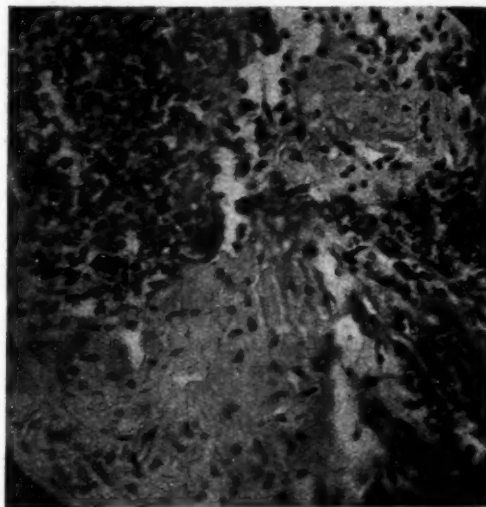
standing one is syphilis. I have not had the opportunity of examining such a specimen except in the case of a radio-resistant tumour of the tongue. Here the main base of the ulcer was formed of epitheliomatous tissue. The surrounding structures showed muscular and salivary gland degeneration, diffuse

**FIGURE IV.**

Section of radionecrotic ulcer, showing relative scantiness of polymorphonuclear leucocytes compared with the masses of fibrous tissue. $\times 160$.

hyaline fibrosis and leucoplakia. No granulation tissue or phagocytosis was shown in the areas where this hyaline tissue abutted on the surface. In non-syphilitic cases the continuance of the ulceration appears to be due to the early formation of a diffuse hyaline tissue. Nuclei are extremely scanty and large masses of homogeneous collagenous tissue

appear. At the surface the nuclear structures disappear and this hyaline tissue presents a fairly sharp line of change into less well stained fibrillar material which forms the base of the ulcer (Figure III). In most cases there is very scanty polymorphonuclear leucocytic reaction, the occasional presence of giant cells, and sometimes a collection of small round cells (Figures IV and V). A freshly removed ulcer was injected with neutral red, but no staining of phagocytic cells could be determined. It would appear that the macrophages which are present in small numbers in this tissue are not so active as normal macrophages.⁽⁹⁾ Since collagenous tissue is not capable of autolysis, and since the phagocytes and leucocytes present are so inadequate in number and function, separation of this yellowish tenacious material is extremely slow, and in fact

**FIGURE V.**

Shows massive hyaline fibrous tissue in base of radionecrotic ulcer with presence of macrophages and giant cells. $\times 120$.

it must needs be removed. A new formation of similar fibrous tissue is continuously taking place in the deeper parts of the ulcer (Figure VI).

Apparently functional nerves (as judged from the almost normal structure) may be found embedded in this fibrous tissue very close to the line of degeneration (Figure VII). Even when there is extreme fibrous tissue formation about them, there is no endoneurial fibrosis and the nuclei of the medullary sheaths appear normal. These probably account for the extreme pain which such patients experience.

The question of adequacy of blood supply or otherwise naturally occurs. In a section of such an ulcer resulting from treatment of a tonsil one fairly large artery showing endarteritis was found, but this by no means proves inadequate circulation (Figure VIII). The question of blood supply of radiated tissues will be considered under late

necrosis, but it may be mentioned that ligation of the external carotid artery of the affected side has in some cases led to a prompt healing of the ulcer.

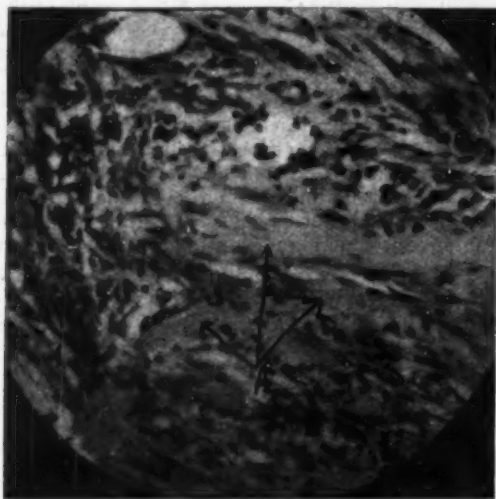


FIGURE VI.

New formation of a hyaline tissue mass, A, is taking place at the base of the ulcer by deposition of collagen by fibrocytes at the surface. $\times 200$.

Frequently one finds that the epithelium grows over the extreme periphery of these areas, but with a new degeneration of the underlying tissues it is

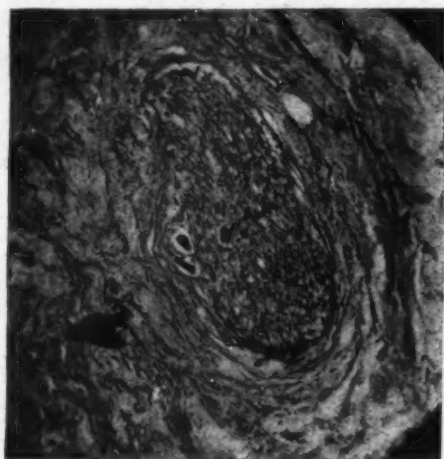


FIGURE VII.

Nerve near base of ulcer. There is marked perineural fibrous tissue condensation and degeneration of the nerve fibres. Many fibres are, however, apparently normal. No endoneurial fibrosis is apparent. $\times 120$.

destroyed. In one case a rather remarkable formation of columnar epithelium has grown over an accumulation of round cells and poorly formed capillaries (Figure IX). No cornification has taken place, however. Ultimate healing occurs only when the new formation of hyaline tissue ceases and the

remnants of it are removed; a poorly formed granulation tissue replaces it and healing takes place over this foundation. Apparently normal areolar

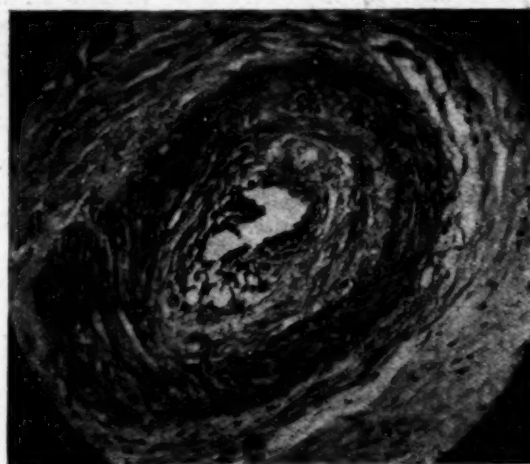


FIGURE VIII.

Endarteritis in base of radionecrotic ulcer. It does not differ from that seen in other ulcers. $\times 120$.

tissue replaces this tissue later, for, though we have no microscopic preparations of such lesions, macroscopically they are quite supple, with a pink scar under healthy epithelium.

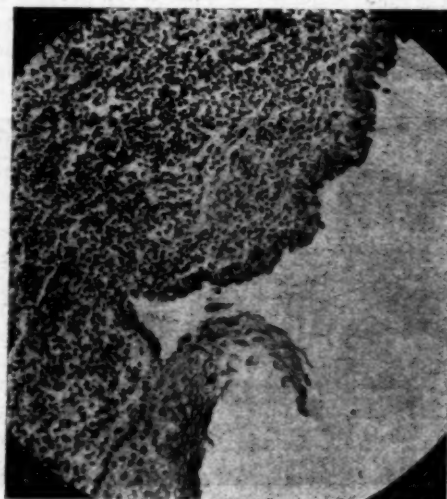


FIGURE IX.

Epithelial ingrowth over area of necrosis which has been removed, leaving only scanty capillaries and massive round-celled accumulations. $\times 120$.

Late Necrosis.

Late necrosis occurs in X ray or radium scars resulting from incident radiation on normal skin or in treated areas. It is apparently more frequent in the indurated scars which were the result of imperfect screening of X rays and radium.

In two such specimens the changes found in the non-ulcerated area were slight thinning of the epithelium with almost absent papillation, loss of sweat and sebaceous glands and hairs. The fibrous corium shows an irregular overgrowth of fibrous and elastic tissue (Figure X). This irregularity is manifested both in arrangement of the fibres and in the total thickness of the layer. In one specimen, even though the irradiation had taken place ten years previously, there is evidence of continued formation of fibrous tissue. Nerves are seen to be of apparently normal structure. Vessels in both cases examined (one a scar on the lower part of the abdomen ten years after X ray therapy to the pelvis, the other a scar on the nose which broke down four years after treatment of a rodent ulcer

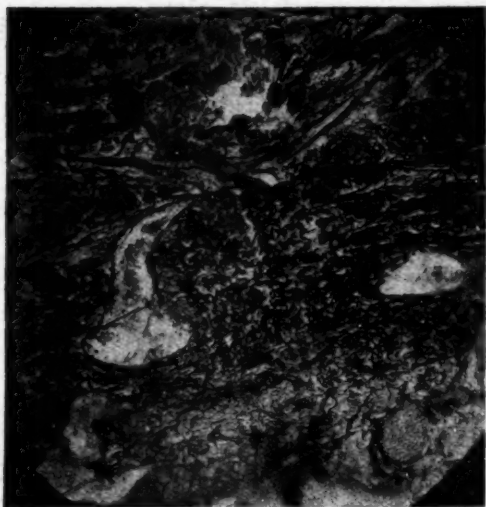


FIGURE X.

The elastic and fibrous tissue of the corium are shown as increased in amount and irregular in arrangement, in a case of radio-dermatitis of ten years' duration. $\times 120$.

with monel needles with 0.4 millimetre of platinum equivalent screenage) show no evidence of *endarteritis obliterans*. There is no evidence of vessels which have become completely obliterated by this change. Telangiectasis of superficial veins is well shown in both cases. The state of the lymphatics is indeterminable from ordinary microscopic section.

In the area of necrosis poorly developed granulation tissue, with thick-walled capillaries of wide lumen, scanty fibroblasts and small round cell collections alternate with areas of sloughing hyaline fibrous tissue corresponding to that seen in the delayed type illustrated above. In the deeper parts evidence of new formation of this tissue is seen with spindle-shaped fibroblasts laying down collagen on to thick strands of homogeneous material (Figure XI). Elastic tissue is also seen in thick fibres in these areas. It is apparently even more resistant to removal than is the fibrous tissue, for in the areas of granulation, where the collagen has

been completely removed, contorted strands of it still occur (Figure XII).

These findings correspond closely with those of Wolbach,^{(13) (11)} Matas,⁽¹²⁾ Rowntree,^{(7) (13)} Ross,⁽¹⁴⁾

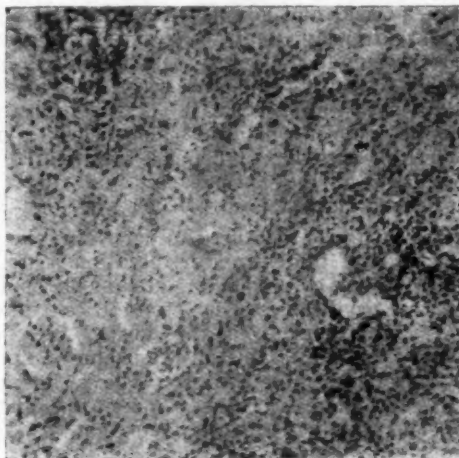


FIGURE XI.

Base of ulcer supervening on radio-dermatitis. New formation of hyaline fibrous tissue is evident. $\times 80$.

Grosman,⁽¹⁵⁾ and Exner, except on two points. All of these workers record a progressive *endarteritis obliterans*. Despite careful search I have not been

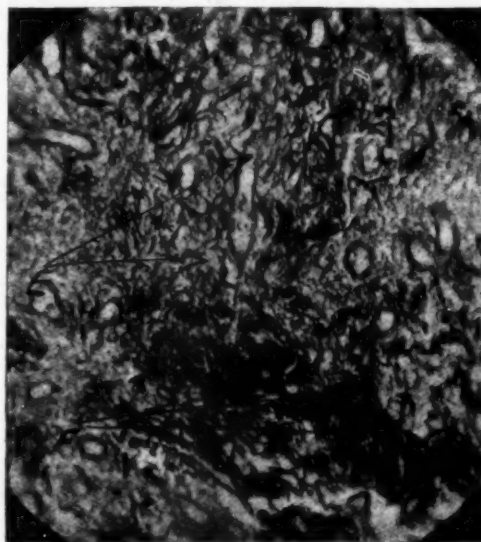


FIGURE XII.

At the surface of the late ulcer contorted strands of elastic (E) and hyaline fibrous tissue (F) are shown in the granulation tissue. The elastic tissue is apparently less readily removed than the fibrous tissue. $\times 120$.

able to find any evidence of this change in these two late cases of necrosis. In one of Matas's patients a rapid widespread necrosis took place, even though no characteristic scarring had occurred. Vascular changes are reported in this case.

To determine whether there was any material reduction in the circulation in such scars as compared with normal skin some precise measurement of heat radiation from the skin was sought. A sensitized thermopile, held three centimetres from the skin, normal and adrenalinized, was tried, but gave an extremely small difference of response. Next, a thermopile applied to the skin under a buckskin cover to control radiation was used, but again the differences were too small. With the use of a thermopile (copper-constantan) covered by a small thin piece of soft wax a definite and regular difference between the normal skin and that into which adrenaline had been pricked was found.

This method was then used to determine the skin temperatures of patients with radiation scars, the control being the corresponding area of the opposite side. Two or three readings were taken of each area. While those from the normal area were practically constant, the galvanometer deflection varied considerably for the scarred area, but in no case was it constantly materially less than that of the normal area. The results are shown in the accompanying table.

| | Normal. | Abnormal. |
|--|-------------------------|-------------------------|
| Adrenalinized skin of observer's hand as compared with identical spot of opposite and normal hand. | 30.60 30.70 | 30.20 30.20 |
| Later in day | 32.60 | 32.30 |
| Mrs. P., aged 56.—Treated ten years ago with epilation dose of deep X rays through 0.5 millimetre of copper. Now hard scar of lower part of left side of neck and chest region showing scaling, telangiectasis and slight breaking down. | 34.70 34.80 | 35.00 34.55 |
| Mrs. W.—Rodent ulcer of neck treated June 22, 1932, through 0.4 millimetre of platinum in monel, 2.0 millicuries in five days. Supple white pigmented scar. | 34.90 | 35.60 |
| A., aged 56.—Epithelioma of ear treated 22 millimetres E.N., 0.4 millimetre of platinum for six days, May 6, 1932. Firm white scar. | 32.65 32.50 32.60 | 32.20 32.45 33.70 |
| Steel.—Epithelioma of lip treated through 0.5 millimetre of platinum, August 2, 1929. | 34.90 34.60 | 34.30 33.75 |
| Neck treated by pack, November 12, 1929. Both show supple white scar. | 34.70 34.30 34.70 | 34.40 34.35 33.90 |

It is evident that though the skin temperature in the scarred area is less stable than that of the normal area, it is not less. The conductivity of the epidermis is certainly a factor, but it is inconceivable that it should be so much increased in the radiation scar as to offset a material reduction in blood flow. From this, then, I conclude that the total blood flow in the scar produced by well screened radium (0.5 millimetre of platinum) and in the thick scar produced by lightly screened X rays is not less than that of normal skin.

The problem of the causation of ulceration in these areas is not a simple one of diminished blood

flow.⁽¹⁶⁾ We have no data as to lymph flow, but there is no oedema to indicate obstruction. We have evidence that the differentiation of elastic and fibrous tissue is abnormal, of the type usually called old and degenerating. The epithelium is thinned and devoid of appendages. In the absence of nutritive change it would appear that there is a premature ageing of the cell constituents; their ultimate death appears analogous to the changes observed by Spear⁽¹⁷⁾ in tissue culture, where, though the fibroblast may be subcultured after non-lethal irradiation, the ultimate life is reduced below that of the culture which is not irradiated.

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NECROSIS FOLLOWING RADIUM TREATMENT: A PRELIMINARY REPORT.¹

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In an endeavour to estimate the factors which may contribute to the development of necrosis following radium treatment, a short *résumé* of the cases so affected has been prepared from the records of the Adelaide Hospital Radium Clinic.

¹ Read at the Fifth Australian Cancer Conference, Canberra, April, 1934.

The types of cases in which necrosis has occurred have been variable; but certain contributing elements appeared to have been fairly constant.

Factors Appearing to Contribute to the Development of Necrosis.

Unsuitable Filtration and Concentration.

As the investigation includes the results of treatment at the clinic since its inception in 1929, and also some results in cases treated before that date, it should be noted that the technique employed has varied considerably in many of the cases. Unscreened surface applications of radium were employed frequently in the treatment of lesions which have been subsequently treated by interstitial or distance methods. Monel metal or even steel filtered needles have been buried in cases in which only platinum filtered needles would be employed with the present methods. And double and triple strength platinum needles have been used less frequently in interstitial treatment in the more recent cases.

CASE 193.—The tongue and floor of the mouth were affected with epithelioma. Steel filtered needles were used. Necrosis of the mandible resulted.

CASE 3.—Rodent ulcer of the chin. Monel metal filtered needles were used. A residuum was left and necrosis occurred. The use of platinum needles was also followed by necrosis.

CASE 1037.—Atypical rodent ulcer of the right cheek. The use of radon needles with a filter of 0.5 millimetre Ni resulted in healing with a firm scar.

CASE 1110.—Epithelioma of the lip. Radon needles (filter 0.5 millimetre Ni) were used. A firm scar resulted. Microscopical examination of a section revealed subacute inflammatory reaction with epithelial inclusion cysts. The area was excised and healing resulted.

CASE 105.—Rodent ulcer of the cheek. Repeated and ineffective unfiltered radium and superficial X ray treatment was employed, with the result that there was necrosis of bone and soft tissues with infection and residuum. Platinum filtered needles were also ineffective. Result: advancing necrosis and residuum.

CASE 11.—Rodent ulcer of the nose. Repeated unfiltered plates were used. Recurrence was treated by means of a mould. Necrosis of bone followed.

CASE 49.—Rodent ulcer of the cheek. Repeated unfiltered plates were employed. Necrosis and recurrence followed. Radon needles with 0.5 millimetre (platinum equivalent) screening were used. Healing is now taking place.

CASE 4.—Rodent ulcer of the ear. Repeated unfiltered plates were used. A residuum was treated by the application of a mould, and necrosis occurred. Surgical diathermy was then employed, and healing resulted.

CASE 129.—Rodent ulcer of the ear. Repeated unfiltered plates were used. A residuum was treated by means of a radon mould. Necrosis occurred. The use of diathermy was followed by an extension of the growth to the cheek. The use of buried platinum needles was followed by healing.

Large Tumours Adjacent to or Involving Bone or Cartilage.

Large tumours adjacent to or involving bone or cartilage have been as a rule inoperable or very advanced and the development of necrosis may have been inevitable in view of the large dose needed to attack the tumour mass, particularly when it involved bone. With regard to the breast cases, unsuitable strength of needles employed has probably been a contributing factor. Double and triple

strength platinum needles were used on account of an insufficient number of suitable unit-strength needles.

CASE 31.—Very advanced carcinoma of the breast. Radium needles, filtered with 0.5 millimetre of platinum were used. A large firm scar with a residuum resulted. A second treatment was followed by necrosis and a residuum.

CASE 268.—Advanced epithelioma of the cheek and ear. The use of radium needles filtered with 0.5 millimetre of platinum was followed by healing. Recurrence was treated by radon needles filtered with 0.5 millimetre of platinum equivalent. Necrosis occurred.

CASE 437.—Epithelioma of the maxilla. Radium needles with a platinum filter of 0.5 millimetre were used. A large dose was given. Healing occurred. A necrotic ulcer occurred on the dorsum of the tongue; it healed.

CASE 522.—Rodent ulcer of the zygomatic region, involving bone. Radium needles filtered with 0.5 millimetre of platinum were used. A residuum was treated by means of a mould. After this there was still a residuum, which was treated with radium needles with a 0.5 millimetre platinum filter. Necrosis occurred. Healing is now slowly proceeding.

CASE 665.—Inoperable carcinoma of the breast. Radium needles with a 0.5 millimetre platinum filter were used. A mould was used for a residuum, and necrosis occurred. Healing is now taking place.

CASE 754.—Inoperable carcinoma of the breast. Radium needles with a filter of 0.5 millimetre of platinum were employed. There is incomplete resolution with a dense scar, which is becoming softer.

CASE 1344.—Myxosarcoma of the antrum. Radium needles with a platinum filter of 0.5 millimetre were used. Resolution of the tumour occurred. Bone necrosis developed.

CASE 1698.—Epithelioma of the fauces and mandible. The use of radium needles with filtration of 0.5 millimetre of platinum was followed by bone necrosis.

CASE 681.—Inoperable carcinoma of the breast. Radium needles filtered with 0.5 millimetre of platinum were employed. A residuum was treated by means of a mould; necrosis occurred and is advancing.

CASE 1105.—Inoperable cancer of the breast fixed to the thorax. The use of radium needles was followed by necrosis involving ribs.

CASE 735.—Inoperable cancer of the breast fixed to the thorax. Radium needles with a platinum filter of 0.5 millimetre were used. Necrosis occurred; but healing is taking place.

CASE 519.—Epithelioma of the floor of the mouth. Radium needles with a 0.5 millimetre platinum screening were used. Necrosis of the mandible followed; healing occurred.

Radium Buried In or Near Infected Tissue.

The decreased radium sensitivity of tissues which are the site of secondary infection has been apparent in several cases, particularly in lesions of the buccal cavity. The extraction or treatment of infected teeth has been adopted as a routine preliminary to the treatment of the primary lesion in all cases of buccal carcinoma (including the lips), and failure to observe this practice in several cases has apparently contributed to some of the unfavourable results.

The association of active syphilis with necrosis following radium treatment has been observed in several cases; although the finding of a positive Wassermann reaction has not invariably been associated with delayed healing or necrosis. The

development of excessive fibrosis in a lip treated with radium in a patient suffering from active syphilis has been observed, however.

The routine treatment of a small epithelioma of the lip was followed by necrosis and continued growth in a patient suffering from active and extensive pulmonary tuberculosis. It was considered that the coexistent lung infection contributed to this unfavourable result.

CASE 1000.—Epithelioma of the lip. Infected teeth were extracted only five days before radium treatment, the mouth infection persisting. The use of radium needles with a platinum screening of 0.5 millimetre was followed in three weeks by surgical dissection of the submaxillary glands. Cellulitis of the neck occurred. Recurrence appeared in twelve months. The patient died.

CASE 1182.—Epithelioma of the tongue. Infected teeth (untreated) were present. Radium needles with a platinum screening of 0.5 millimetre were used on two occasions at an interval of four months. Necrosis occurred after the second treatment.

CASE 1617.—Epithelioma of the lip. Radium needles with a platinum screening of 0.5 millimetre were used. There was a residuum with much fibrosis; this was treated by excision and plastic repair. A recurrence appeared in the scar. Radium needles, similarly filtered, were used, and further operation was performed. The patient's blood reacted to the Wassermann test.

CASE 289.—Epithelioma of the lip. The patient had active pulmonary tuberculosis. Radium needles with a platinum screening of 0.5 millimetre were used. A second treatment was employed for a residuum. This was followed by necrosis; there was still a residuum. Growth continued and death occurred.

Unfavourable Sites for Interstitial Treatment.

Necrosis following the treatment of epithelioma of the back of the hand by buried radium needles filtered with 0.5 millimetre of platinum, was observed in several cases during 1929 and 1930. And, as the technique employed was similar to that used for the treatment of squamous epithelioma in other parts, it was considered that the site of the tumour might be unsuitable for such treatment. The relatively poor blood supply of the skin in this region and the proximity of the buried needles to bone seemed to lend colour to such a theory. Adoption of surface technique has been followed by improved results, and radium moulds are now recommended as the routine treatment for these lesions. Similarly, the interstitial treatment of lesions of the nose and ear has been found less satisfactory than mould treatment.

Interstitial treatment of epithelioma involving the skin of the neck has been followed by delayed healing and necrosis in a very small series of cases. It has been suggested that the fibrous character of the subcutaneous tissues in this region may have been the underlying cause of failure.

CASE 933.—Rodent ulcer of the skin of the neck. A radium mould was used. A residuum was treated by radium needles with a platinum screening of 0.5 millimetre. Necrosis occurred. The ulcer, which extended into the sterno-mastoid muscle, was excised.

CASE 1961.—Rodent ulcer of the chin. Radon needles with 0.5 millimetre of platinum equivalent filtration were used. Necrosis occurred.

CASE 655.—Epithelioma of the temple. Treatment with radium needles with a screening of 0.5 millimetre of

platinum was followed by necrosis. Healing occurred in twelve months.

CASE 897.—Rodent ulcer of the nose. Radium needles with a screening of 0.5 millimetre of platinum were used. Necrosis occurred, and healed in twelve months. The scar is fixed to bone.

CASE 647.—Epithelioma of the back of the hand. The use of radium needles filtered with 0.5 millimetre of platinum was followed by necrosis. Healing occurred in sixteen months.

CASE 396.—Epithelioma of the back of the hand. Radium needles with a 0.5 millimetre monel metal screen were used. A residuum was treated by radium needles with a platinum screening of 0.5 millimetre. Necrosis occurred. Healing took twelve months.

Conclusions.

1. It appears that 0.5 millimetre of platinum should be the minimum filtration for the treatment of squamous-celled epithelioma. In the treatment of lesions adjacent to or involving bone it is probable that increase of filtration to 1.0 millimetre of platinum would be desirable if interstitial treatment were contemplated.

2. Surface technique, in the form of moulds, appears to possess advantages over interstitial methods in lesions involving bone or cartilage.

3. An attempt should be made to eliminate infection before radium treatment is commenced.

4. Concurrent syphilis should be treated before and during the progress of radium treatment.

5. It appears that in certain lesions (particularly those involving bone) necrosis is inevitable if radium treatment is to be effective in destroying the neoplasm.

X RAY NECROSIS.¹

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WHEN I agreed to contribute a paper on the subject of X ray necrosis I thought I knew quite a reasonable amount about the subject. I now confess that my knowledge is very superficial. Moreover, although there is much written about it, it is astonishing to find how little there is to provide satisfaction to the inquiring mind. Unfortunately, too, neither Professor Welsh nor any of my colleagues could provide what I myself did not possess, namely, a section or a block of tissue showing radio-necrosis. The preparation of the subject matter of this paper has presented unexpected difficulties, and Professor Welsh and I, after comparing notes, have decided to make only introductory remarks on the subject and to ask you to defer full consideration of it until the next conference.

X ray necrosis can, of course, be separated into necrosis of the acute type due to a single overdose or to a series of exposures of which the sum amounts to an overdose, and late X ray necrosis.

¹ Read at the Fifth Australian Cancer Conference, Canberra, April, 1934.

Acute X Ray Necrosis.

In acute necrosis the result is a rapid progression through the ordinary stage of erythema to vesiculation. This in turn is followed by sloughing of the surface layers, the slough being moist, very adherent, and greyish-green in colour. The process is accompanied by acute and persistent burning pain, which resists all local applications, and indeed is generally made worse by the influence of active chemical substances. Such dressings, too, act adversely upon the already damaged tissues, and are liable to increase the depth to which the sloughing process extends (the effect of antiseptic dressings on top of a normal reaction).

If the dose has not been too great, islands of epithelium, representing the openings of hair follicles and skin glands, may survive and provide centres from which epithelium may grow to cover the denuded surface when the sloughs finally separate. The length of time during which the ulceration may persist varies with the depth of the sloughing process and, most important, with the area of surface involved. Healing may be, and generally is, very slow, and the resulting cicatrix is weak and covered with atrophic epithelium. Later, dilatations of small blood vessels produce telangiectases, and still later, flecks of pigment and hyperkeratotic patches develop. Still later, warty projections may form and give rise to carcinoma after a varying interval, or carcinoma may develop independently of these warty growths.

In severe cases the ulcer may never heal, and skin grafting may fail from lack of sufficient blood supply, so that the area may have to be deeply excised and covered by means of a tube graft or similar expedient.

Late X Ray Necrosis.

Late X ray necrosis may develop a year up to five or more years after the actual irradiation. It may develop as a late result of an acute burn which has healed, or of a too frequent repetition of doses on the same area of skin, perhaps extending over years without there ever having been an erythema.

But it may be said that late X ray necrosis never occurs on an area of apparently normal skin. It always supervenes upon an area of chronic radio-dermatitis, which is the first effect of overdosage either at one or several or many treatments. The appearance produced is that of dry gangrenous patches, dark brown to black in colour, shrunken below the main surface, and looking like stained pig skin. It may take months before these separate and leave ulcers which take many months to heal, but generally refuse to heal completely without some plastic surgery. This is especially the case if the ulcers exist in the middle of a large area of radio-dermatitis. The pain is notable, but not to be compared with the pain occasioned by acute sloughing induced by a recent X ray burn.

The depth to which the ulceration extends is very rarely greater than that of the skin, and for a very long time part of the slough remains firmly

adherent to the base. The extent of surface involved in the ulceration, but also in the chronic radio-dermatitis surrounding the ulcer, is the most important factor in the prognosis. If the area of ulceration is small, though the ulcer is deep, and if the ulcer is surrounded by only a narrow band of chronic radio-dermatitis, the prospect is good, because of the existence of a good blood supply in the neighbouring tissue. Conversely, if the ulcer, though only shallow, is in the centre of a large area of radio-dermatitis with gravely damaged blood vessels, the outlook is practically hopeless as regards healing.

Only once in my experience has necrosis of skeletal tissue been observed. This was in the case of a woman with an extensive area of chronic radio-dermatitis over the thorax, to whom I had, in the early days of such work, repeated too frequently deep X ray treatment for carcinoma of the breast. She was at the time only twenty-five years of age, and Sir Alexander MacCormick, who performed the operation, said he was perfectly sure that he had not been able to get outside the growth, which was particularly active in the inner part of the breast. Three successive series of deep X radiation were given, each of which provoked a definite erythema. The patient, at least up to three years ago, then eight years after treatment, remained free of recurrence; but practically the whole area showed chronic X ray dermatitis, and in the region over the costal cartilages a deep late ulcer developed and persisted for months until a portion of costal cartilage about an inch long separated and was removed. The ulcer then slowly healed.

These effects are undoubtedly bound up with interference with nutrition, probably due to endarteritis and fibrosis, causing compression. And it is this interference with nutrition that makes it necessary to provide a skin graft with blood supply independent of the base and edges of the ulcer that is to be covered.

These accidents will become less and less frequent as the means of measuring doses is improved, and experience teaches the operator that, even without producing an erythema, too prolonged and too frequently repeated treatment can well determine, years after, an area of radio-necrosis and an intractable X ray ulcer.

Reviews.**A TEXT BOOK OF MEDICINE.**

THE fourth edition of what is popularly known as "Price's Text Book of Medicine" has recently been made available in Australia. It was published in London at the end of last year, and its thoroughly revised and up-to-date contents reflect credit on its editor and publishers. Few

¹"A Textbook of the Practice of Medicine", by various authors, edited by F. W. Price, M.D., F.R.S.; Fourth Edition; 1933. London: Humphrey Milford (Oxford University Press); Australia: Angus and Robertson. Royal 8vo., pp. 2046. Price: 56s. net.

text books show such constant endeavour to present the latest information in all sections. One such illustration is the editor's apology in the preface for his inability at that late stage to transfer the article on influenza from the section of diseases of doubtful or unknown aetiology to the section on virus diseases, in view of the recent work at the Mill Hill Laboratories.

Other new matter has reference to recent advances in bacteriology, immunology and vitamins; to the use of new compounds in the treatment of syphilis and malaria, the bacteriological diagnosis of whooping cough, aetiology of rheumatic fever, sprue and glandular fever; glucose and insulin therapy in heart disease, new applications of electrocardiography; Felton's serum in lobar pneumonia, recent therapy in asthma; renal function estimation; the pathogenesis of *tabes dorsalis*, epilepsy and alkalemia, and some new applications of psychotherapy. The discussion on virus diseases contains much that is new to this and most text books, and, of course, endocrinology is forever green.

In addition to the usual revision of subjects in the light of current work, many of the sections contain articles new to this edition or very largely rewritten. This is responsible for the increase in size to nearly two thousand pages. Whilst this may be a disadvantage to the student who may wish to make the book his text book, he will appreciate it the more as a reference book. As such there is no doubt of its value, both to the senior student and to the practitioner. It is not too great a compliment to say that the editor's purpose has been achieved and that the book is "of service to teachers of medicine, consultants, general practitioners and students alike". Rather an ambitious project, but accomplished more in this edition than in most publications of similar size.

It is difficult to single out the work of any particular contributor, so ably have most of them discharged their respective tasks. Interest is aroused by many excellent chapters from the pen of Dr. Arthur Hurst, of Guy's Hospital, on gastro-enterology. He is well known for his sound views based on a thorough knowledge of the physiology and pathology of the alimentary tract. It is therefore interesting to note that he still adheres to his statement that the majority of cases of ulcerative colitis are really chronic bacillary dysentery, and claims good results from polyvalent dysenteric serum. He is equally dogmatic about the functional nature of many cases of constipation and the widespread abuse of aperients. Again, regarding the so-called pernicious vomiting of pregnancy, he states: "I am convinced that it is always hysterical", and claims results with suggestion in cases where the ammonia coefficient has risen to as high a figure as twenty-eight from the normal five.

Many may value this edition above others for the chapter on haematology, which has this time very appropriately been rewritten by Dr. Witts. Dr. George Graham, of Saint Bartholomew's, continues as the contributor of diseases of metabolism and deals with recent variations in treatment in *diabetes mellitus* and in diabetic coma.

Other contributors include Lord Horder (immunity, vaccine therapy, and diseases of the spleen and lymphatic system), Dr. Young and Dr. Beaumont (diseases of the chest), Professor Langdon Brown and Dr. Geoffrey Evans (renal disease), Dr. C. Box, Dr. G. C. Low and Dr. Hamilton Fairley (tropical diseases), Colonel Harrison (venereal diseases), Dr. Frederick Price (cardiology), Dr. O. Leyton (endocrinology), Dr. Macnamara (psychological medicine), Dr. A. H. M. Gray (dermatology), and also Sir William Willcox, Dr. John Matthews, and Professor Pembrey and Professor Plimmer, of London University.

To be critical, we are frankly disappointed in the section dealing with the lymphatic system. Five pages include a description of Hodgkin's disease; in these the work of Gordon and others on bone marrow is not mentioned. These pages do not compare favourably with the other very full contributions from the same distinguished worker. Again, one wonders whether in a volume of such undoubted popularity among general physicians there is not too much insistence on detail in the sections of skin

and tropical diseases. These take up a lot of space, and as the volume can hardly be enlarged to include further sections, one feels that medical paediatrics could take a little of their place.

This review would not do justice, however, if some mention were not made of the excellent neurological section written by Collier and Adie. This, with a very short treatise on psychological medicine, comprises the last four hundred pages of the work. The book is worth purchasing, if only for this portion, which in itself could rank as a first class text book of neurology. This subject is not always easy to read, even to those more or less familiar with it. It is often the *bête noire* of the student. Yet these chapters make delightful reading. We recognize in most of the articles the style of James Collier, who certainly can, and does, write excellent prose. To the post-graduate student who has heard him lecture, many phrases will be familiar, and this section is well worth perusal for the sake of the pleasure it gives.

THERAPEUTICS.

THE second edition of Dr. Campbell's popular "Handbook of Therapeutics" represents a thorough revision of the text of the first edition conformable to recent knowledge and practice and to the new edition of the British Pharmacopoeia.¹ No great changes have been necessary, the most important being a rewriting of the articles on the anemias and tetany, and additions to the sections dealing with tropical diseases and vitamin deficiencies. The ketogenic and higher carbohydrate diets are considered. Epidural, but not intraneural, injection for sciatica is introduced. Many probably will agree that the treatment of chorea with the dramatic but dangerous drug nirvanol is given undue prominence. The value of carbon dioxide as a respiratory stimulant is emphasized. The therapeutic exploitation of variations in acid-base equilibrium is treated with sound judgement in various sections. The most debatable recommendations are decompression by lumbar puncture in extradural haemorrhage and operation for empyema as soon as pus is discovered. The article on infant feeding has been extended, but breast-feeding could be granted more consideration.

The clear exposition of the principles and practical application of therapeutic measures, which characterized the former edition, has been maintained. The incorporation of the new material will enhance still further the value of this book to the student and the general practitioner as a concise text book of modern treatment.

Notes on Books, Current Journals and New Appliances.

CONTRACEPTION.

Books on contraception must have a ready sale, for their name is legion. From the pen of Dr. Gladys M. Cox comes "Clinical Contraception".² This book has been written at the suggestion of the National Birth Control Association. It is written along the usual lines and apparently contains nothing new. A foreword is written by Lord Horder of Ashford.

¹ "Handbook of Therapeutics", by D. Campbell, M.A., B.Sc., M.D., F.R.F.P.S.; Second Edition; 1934. Edinburgh: E. and S. Livingstone; Australia: Angus and Robertson. Crown 8vo., pp. 464, with illustrations. Price: 19s. net.

² "Clinical Contraception", by G. M. Cox, M.B., B.S., with introduction by Lord Horder of Ashford, K.C.V.O., M.D., F.R.C.P.; 1933. London: William Heinemann (Medical Books), Limited. Demy 8vo., pp. 133, with illustrations. Price: 7s. 6d. net.

The Medical Journal of Australia

SATURDAY, JULY 7, 1934.

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Authors who are not accustomed to preparing drawings or photographic prints for reproduction, are invited to seek the advice of the Editor.

THE MORTALITY IN APPENDICITIS.

DURING 1932, 491 persons in Australia died of appendicitis. The total number of deaths for the twelve months was 56,757. The number of deaths from appendicitis may at first sight not seem large; but, when we remember that early diagnosis and immediate operation will in most instances lead to the recovery of the patient, the total of 491 cannot be regarded as small. Appendicitis is a condition that almost every physician, surgeon and general practitioner encounters. It is a condition that every practitioner should know how to treat. The various aspects of the appendicitis problem have been discussed in these pages from time to time. Emphasis has been laid on the importance of early diagnosis and on the need for surgical intervention as soon as the diagnosis has been made. Quite recently the delayed operative, or expectant, treatment of appendicitis was referred to, and the conclusion was stated that expectant treatment should be undertaken only when the patient is under constant observation by skilled attendants, so that operation can be undertaken without delay if the inflammation of the appendix should not subside. Medical practitioners throughout the Commonwealth are

alive to the problems of diagnosis and treatment, and there are relatively few places in which a person stricken with appendicitis cannot receive adequate attention. The possibility of reducing the mortality from appendicitis has not been discussed for some time. Reference to this aspect is suggested by a report of efforts made in Philadelphia to bring about a reduction.¹

The mortality from appendicitis would be reduced considerably if patients sought medical advice as soon as they experienced unusual abdominal symptoms, if a prompt diagnosis were made, if no unwise pre-operative treatment were ordered, and if the abdomen were opened with the least possible delay. This is all quite obvious and sounds simple enough. There are difficulties, however. Patients do not always seek advice without delay. Sometimes they attach no importance to the initial symptoms; and often, on their own initiative or on the advice of a relative or friend, they take an aperient, sometimes with disastrous results. It is possible, if they do seek advice, that the signs and symptoms may be equivocal and that unsuitable treatment may be instituted. Circumstances such as these militate against the patient's chances of recovery when operation is undertaken. Finally, operation may not always be performed as skilfully as it should be, the tissues may not be handled with the lightness, with the delicacy and care that are their due. At Philadelphia a campaign for the reduction of mortality from appendicitis has been undertaken during the past few years. Attention has been paid chiefly to high school students of both junior and senior grades. Circulars were issued to the students—the circulars were pasted into their text books. Talks were also given to several thousands of students, and in these talks the dangers of delay in admission to hospital and in the giving of laxatives were emphasized. A diminished mortality is claimed as a result of the following factors: (i) a definite increase in the number of cases over preceding years, (ii) earlier hospitalization, (iii) a diminished number of cases of peritonitis, (iv) a diminished number of cases

¹ John O. Bower: "Acute Appendicitis in Philadelphia: A Report of the Progress made in the Campaign for its Reduction". *The Journal of the American Medical Association*, March 17, 1934, page 813.

of spreading peritonitis, (v) an improvement in the management of spreading peritonitis by the surgeons of Philadelphia, (vi) less frequent administration of laxatives. It is interesting to note in passing that the mortality from appendicitis in at least some parts of the United States of America is much higher than in Australia. The death rate per hundred thousand from appendicitis in twenty-nine cities of more than 300,000 population during 1932 was 15.64. In the whole of Australia for the same year the rate per hundred thousand was 7.5. The statement is made (it is called an indictment) that fifty-five physicians prescribed laxatives to fifty-five patients suffering from appendicitis, and that this resulted in four deaths.

If the mortality from appendicitis in Australia is to be reduced, the problem must be tackled from two points of view. The first has to do with the patient, who must be taught certain facts; the second concerns the medical practitioner. Of these two aspects the former requires the more attention. The instruction of the public is always difficult. The Philadelphia authorities paid attention to the group of people from whose ranks most cases of appendicitis come. One would expect that such intensive propaganda as pasting into the text books of students facts about abdominal pain and the taking of aperients would make the students introspective and that many more cases of appendicitis would be diagnosed. This apparently happened. The difficulty of teaching the public about its health without causing a phobia or without giving rise to undue introspection is a real one. The difficulty is greater in regard to such conditions as cancer, which affect older people, than it is with appendicitis, which occurs most commonly in those of the younger generation. Some sort of instruction should be given in schools and colleges, and the subject can more profitably be introduced as part of the question of the use of aperients in general than as instruction calculated to make the student think particularly of appendicitis. The same method of approach should also be used in wireless and other health talks. As far as the medical practitioner is concerned, there is only one point in the Pennsylvania report to which we would refer. A plea is entered for more frequent consultation with

surgeons of experience when cases are being dealt with in which perforation has occurred or is suspected. The following words are worth quoting: "Wisdom in surgery usually increases with experience, but not always. The clinical records reviewed showed that a man may spend decades managing spreading peritonitis and still have a mortality of 65 per cent." The attribute most prized in a surgeon is soundness of judgement. This attribute is born of humility and of a mind that is open to receive fresh impressions, that can store its experiences, and that can draw upon them with discrimination and detachment as occasion arises. When the life of a patient is at stake, the opinion of a practitioner known to have sound judgement should always be obtained. No medical attendant ever loses caste by making certain that his patient is receiving the treatment best suited to his condition.

Current Comment.

ACUTE RHEUMATISM AND THE KIDNEYS.

WHEN we think of acute rheumatism we think of an acute infection due to a streptococcus and giving rise to a definite clinical picture. When once the involvement of the joints has subsided attention is centred on the heart; involvement of the myocardium and of the endocardial lining is sought with such diligence that clinicians are apt to look on cardiac involvement as almost the only pathological sequel. A moment's thought, of course, will show that such a supposition would be unreasonable. So active an infection as acute rheumatism must be blood-borne. It has been stated that the well-known Aschoff bodies found in the myocardium are the only constant pathological sequelæ of acute rheumatic infection; and on this account a special vulnerability of the myocardium has been postulated. A blood-borne infection that would cause permanent and sometimes extensive damage in the heart would be expected to have other sequelæ. Coates and others have held that rheumatic infection gives rise to a specific tissue reaction. Renal lesions have also been described by such observers as Stettner, Veil and Evans. Pappenheimer and von Glahn have described endarteritis of the intestinal blood vessels; and Poynton and Paine have drawn attention to perivascular fibrosis around the small arterioles in the synovial membranes. Klotz was probably the first to hold that widespread lesions occurred in the arterioles of the viscera in acute rheumatism. The lesions described by him included a perivascular infiltration in relation to the smaller vessels of the kidney,

comparable to the infiltration found in the myocardium.

J. L. Blaisdell has recently discussed the renal lesions of acute rheumatism.¹ He holds that though the Aschoff nodule is probably the only truly specific histological expression of acute rheumatism, its presence must be regarded as representing merely one particular phase in the course of a morbid process, and as such must probably be looked on as an extreme manifestation of a general mode of reaction. He thinks that the Aschoff nodule probably passes through a fairly definite life cycle. The purpose of his article is to draw attention to what he calls less specific, local inflammatory reactions in relation to smaller vessels, particularly in the kidneys. His study embraced sixteen cases of proved acute rheumatism. (He uses the term rheumatic fever throughout.) The cases all came to autopsy. Ten of the patients ranged from 18 to 52 years of age; six ranged from 3 to 13 years of age. Definite Aschoff nodules were found in the myocardium in 13 of the 16 cases. Lesions were found in the kidneys in 14 instances. The changes occurred in relation to the smaller vascular structures, particularly the intralobular and arcuate arteries and the arterioles of the cortex; they were never observed in relation to the larger branches of the renal vessels. Three types of pathological change were observed. In eight of the sixteen cases acute or subacute inflammation was present; in four instances a chronic or healed lesion was present; in two instances a recurring type of inflammation was encountered. Blaisdell describes the detailed microscopic appearances of each type. In addition to studying these sixteen cases Blaisdell reviewed the evidence of rheumatic heart disease forthcoming during a period of seven years. Among 2400 autopsies, 128 cases (5.3%) were found showing either healed or active cardiac lesions. In this group interstitial nephritis had been diagnosed in 38 instances (30%). Half of these cases had occurred in persons under forty years of age, and one-third in persons under thirty years of age. From these findings Blaisdell concludes, first, that a definite association exists between acute rheumatism and renal disease, and, secondly, that a high percentage of these persons show evidence of chronic kidney damage at an early period of life. On the other hand, arteriosclerotic kidney, which was met with in 19 of the 128 cases, occurred chiefly beyond the age of fifty. This, Blaisdell holds, is in keeping with the observation that only the smaller arteries and arterioles are involved in the pathological process of acute rheumatism.

The work described by Blaisdell is interesting in that it gives the clinician a wider view of acute rheumatism. When rheumatism is spoken of as an infective process, it must be remembered that this conception of the disease has not been definitely shown to be correct. Even those who hold that it is caused by a streptococcus are divided amongst themselves. Some observers would incriminate a

specific streptococcus and others pin their faith on what is known as the multiple streptococcal theory. In all probability the process is infective and produces its main pathological effect on the vascular system. Doubtless the reaction of the patient, in other words, of the tissue attacked, has a great deal to do with the clinical manifestations. Until more is known of the interaction of infective agent and infected tissue the mystery will not be solved. As far as kidney damage in acute rheumatism is concerned, Blaisdell has shown that the damage is seldom so extensive as to lead to a diagnosis of nephritis, but at the same time the clinician must remember that the kidneys are not likely to emerge intact from an acute rheumatic infection.

ACUTE APPENDICITIS.

SINCE it has a bearing on the subject of the leading article in this issue attention should be drawn to a report published by E. P. Quain on one thousand consecutive cases of acute appendicitis.¹ This is the second report on one thousand cases that he has published. He divides his cases into three groups, at the same time admitting that his classification is not scientific. In Group I he places all cases in which drainage was not used. In Groups II and III he includes appendicitis with abscess and local or progressive peritonitis. No case of appendicitis was included in Group I unless the appendix was "so acutely infiltrated, thickened, distended or surrounded by recent adhesions, exudate or fibrinous deposits that any tyro in the profession could recognize it as the site of an acute infection". So-called interval appendicitis was not included. Group I comprised 637 patients; two of these died. Group II comprised 212 patients; nine died. Group III included 151 patients; 27 died. The time of operation after the onset of symptoms is interesting. In Group I the interval varied between half a day and twenty-six days, with an average of three and a quarter days. In Groups II and III the figures were respectively: half a day to twenty-one days, with an average of four and three-quarter days; one day to twenty-two days, with an average of four and a half days. The average mortality in the total number of cases was 3.8%. It is interesting to note that the average period coincides with the period during which the local and general resistance of the patient is held to be at its lowest ebb. In the second series (the mortality in this series was higher than in the first) the average interval of time that elapsed between the onset of illness and operation was twelve hours longer than in the first. This is thought to be due largely to the hard times and to a wait and see policy before expense in medical care is incurred. In the light of what appears in the leading article the lesson here is obvious.

¹ *The American Journal of Pathology*, March, 1934.

¹ *Archives of Surgery*, April, 1934.

Abstracts from Current Medical Literature.

SURGERY.

Gall-Bladder Disease.

RUSSELL S. FOWLER (*American Journal of Surgery*, October, 1933) has made an attempt to follow up patients operated upon for gall-bladder disease. Reports are tabulated of the immediate results of twelve hundred and six operations with a mortality of 5.9%. The author refers to his researches in 1916, when he stated that cholecystitis was a progressive disease and should be treated by cholecystectomy whenever continued disabling symptoms occurred. He estimates that only 20 of each 100 persons having symptoms will require operation. In deciding the need for operation, the history is of more value than physical examination in most instances. Clinical findings are described as falling into a series of separate groups, each of which is fully considered with regard to the underlying pathology and consequent operative requirements. Of 979 patients submitted to removal or drainage of the gall-bladder, 81.8% remained quite well at the end of one year or more. The other 178 patients, representing 18.2%, exhibited mild or severe grades of indigestion. The author attributes the continuance of symptoms in many instances to delayed operation resulting in complications involving liver, bile ducts, adjacent adhesions, or to more remote results due to infection.

Geographic Distribution of Peptic Ulcer.

HUGO MÜLLER (*The American Journal of Surgery*, March, 1934) has analysed mortality and morbidity from peptic ulcer in several countries having statistics available. In the United States of America negroes suffer less from ulcer than do whites. The mortality of gastric ulcer is much higher than that of duodenal ulcer. Despite the popularity of condiments and peppers, there is a very low incidence of ulcer reported from Mexico. In the West Indies and Panama ulcer is not common, but negroes show the higher incidence. Argentina also has a very low record, for among 7,970 hospital admissions in 1926 there was only one case of ulcer. In 1,041 autopsies made between 1922 and 1927 only 30 peptic ulcers were found, 27 of them being in males. Reports from Africa deal solely with Abyssinia, where ulcer is common among natives and rare among whites, just the reverse to the incidence of appendicitis. However, the Wassermann test gives a positive reaction in 95% of natives. In Syria ulcer is said to be common among males, whereas appendicitis is seldom seen. Despite the vegetarian habits of the Indian natives, peptic ulcers are common, especially in the

southern districts, becoming less common in the hills. In Korea and China ulcer is frequently encountered. The Chinese as a rule have excellent teeth, while the Koreans are given to excessive consumption of alcohol. Stewart, of Leeds, found 8.7% of ulcers in 1,500 autopsies. The gourmands of Denmark are very susceptible to ulcer, while ulcer is rare in Russia. The author comments on the universal greater incidence of ulcer in males than in females. Climate is not an aetiological factor. Whites are less subject to ulcer when living in the tropics. No accusation is laid against condiments or focal sepsis. Hot drinks may be a factor in Chinese. Worry is also blameless, for females are the chief sufferers in American cities.

Calcification, Decalcification and Ossification.

R. WATSON JONES AND R. E. ROBERTS (*The British Journal of Surgery*, January, 1934) describe calcification, decalcification and ossification. Bone undergoes decalcification if the blood supply is increased, and increased calcification if the blood supply is decreased. Pathological calcification is observed in any mesenchymatous tissue of low metabolism when the vascularity is further reduced by the fibrosis of trauma or of infection. Bone may form in any region where there are fibroblasts, excess of calcium and an adequate blood supply. The radiologist must interpret decalcification of bone as evidence of hyperæmia, and increased calcification as evidence of ischæmia. If in the presence of decalcification of adjacent bones one fragment retains its original calcium content, the fragment is avascular. This may prove dislocation which is now reduced (for example, astragalus, semilunar scaphoid). Hyperæmic decalcification must be distinguished from destruction. Decalcified bone adjacent to an infective focus may appear to be destroyed, though actually normal. In tuberculous disease the area of destruction is much less than the area of decalcification. In osteolytic sarcomata the tumour is less extensive than X rays suggest. Apparent regeneration after treatment is due to recalcification. Non-union of fractures is due to traumatic hyperæmic decalcification from inadequate immobilization. Compound fractures, although more decalcified owing to infective hyperæmia, may still unite if immobilized. A bone graft never becomes vascularized. It is a local excess of calcium which assists in the repair of ununited fractures, tuberculous osteitis, and bone cysts. Three degrees of spontaneous hyperæmic dislocation of the atlas may occur without complication, with paraplegia, and with sudden death. Nephrolithiasis may result from generalized disuse and recumbency in fractures, tuberculous joints, pneumonia *et cetera*, owing to excessive excretion of calcium. It is similar to

the renal calculi of *osteitis fibrosa* and the vesical calculi of *osteitis deformans*. Increased calcification of bone is evidence of diminished vitality. The elasticity is reduced and the bone is abnormally fragile (Paget's disease, Albers-Schönberg's disease, Charcot's disease). Kienbock's disease of the semilunar is due to impaired vascularity. The bone undergoes necrosis and must be excised. Preiser's disease of the scaphoid is not a clinical entity. It is a stage of non-union of fracture of the scaphoid and is cured by immobilization. Panner's disease and Freiberg's disease of the metatarsal are due to impaired vascularity and are analogous to Kienbock's disease. Calcification of the supraspinatus tendon is due to the trauma of impingement of the tendon against bone. Pain is due to tension, and symptoms are relieved by any measure which reduces tension. Spontaneous absorption may occur. The hæmatoma undergoes calcification when it is organized. The phlebolith, the calcified cavernous angioma and the calcinosis of Raynaud's disease are of a similar type. Calcification of the intervertebral disk and the semilunar cartilage are due to impairment of vascularity from repeated slight trauma. Whenever the periosteum is elevated, bone is found within the new limits of the periosteum (bone spurs, normal bone ridges, subperiosteal hæmatomata). The subperiosteal ossification of avulsed muscles may occur at the elbow, knee, ankle or shoulder. It is purely traumatic and can be prevented. The term *myositis ossificans* should not be applied to these cases, but should be reserved for the progressive disease. Heterotopic ossification of tendon is most common in the tendo *Achillis*; in such cases tenotomy is frequently a causative factor. Ossification may occur in the semilunar cartilages. The condition is difficult to differentiate radiologically from loose bodies in the knee joint.

Gynæcological Aspects of the Aetiology and Treatment of Chronic Mastitis.

HOWARD C. TAYLOR (*Surgery, Gynecology and Obstetrics*, November, 1933) writes about the gynæcological aspects of the aetiology and treatment of chronic mastitis. The painful, diffusely swollen or nodular breast is one of a wide variety of conditions which now pass under the name of chronic mastitis. This special form of breast disease is apparently very common, for, with a few exceptions, the 102 patients discussed in this report were admitted to the breast clinic of the Memorial Hospital within a period of only two years. Chronic mastitis of the type characterized by pain, ill-defined nodules, and diffuse swelling has a marked tendency to spontaneous improvement. Following the physiological changes of pregnancy or the menopause, improvement

may be especially marked. The elimination of pelvic lesions either by surgical or non-surgical treatment is followed by a somewhat greater percentage of cures than is observation alone. When important pelvic lesions exist, their correction should be the first step in the treatment of diffuse mastitis of the type under consideration. Irradiation of the ovaries, either with the production of an artificial menopause or by a smaller dose, is very effective, although applicable only to certain cases. The administration by mouth of the older forms of ovarian extract or residue is useless. Trial of more potent modern preparations of follicular and anterior pituitary hormones is indicated when breast symptoms are associated with disturbed menstruation.

Early Recognition of Ilio-Pectineal Bursitis.

DENIS S. O'CONNOR (*Surgery, Gynecology and Obstetrics*, November, 1933) writes of the early recognition of ilio-pectineal bursitis. Ilio-psoas or, more properly, ilio-pectineal bursitis has been recognized since 1834. Ilio-pectineal bursitis is not uncommon, but is not commonly recognized. Failure of recognition results in mistaken diagnosis followed by the performance of serious surgical operations and at times by serious disability. The symptoms and signs of the condition are clear and permit a clear-cut differential diagnosis. The treatment is the treatment of any bursitis, and the results of treatment are commensurate with the appreciation of the underlying aetiological factors and the surgeon's understanding of the pathology of the bursa. The location of tenderness in ilio-pectineal bursitis is so definite that its elicitation may be said to constitute the basis of a diagnosis. The frequency of communication between the bursa and the hip joint makes it necessary for the orthopaedist to consider the possible presence of this bursa in all hip joint complaints.

Krukenberg Tumour.

R. W. BINKLEY (*Western Journal of Surgery, Obstetrics and Gynecology*, February, 1934) reports an autopsy on a patient of thirty-nine years having carcinoma of the stomach with bilateral ovarian tumours. Krukenberg described the condition in 1896; his original description is still applicable. No instance of permanent cure is recorded: Krukenberg believed the condition to originate in the ovary. Six years later Schlagenhauser concluded it to be metastatic, often secondary to gastric carcinoma. In 1918 Majors studied the condition and concluded that the ovarian tumours were carcinomata with some features of fibro-sarcoma. The primary lesion is often obscure and found only at careful autopsy. The condition is rare, only 104 cases being reported

prior to December, 1933. The author's patient complained of abdominal pain and low backache. A pre-operative diagnosis of multiple uterine fibroids was made and laparotomy was advised. Ascites developed rapidly and her general condition precluded surgical operation. At autopsy a malignant ulcer of the stomach and bilateral carcinomata of the ovaries were found. The author draws attention to the absence of gastric symptoms in this patient. In most recorded cases examination of the alimentary tract for a primary lesion has been inadequate. Diversity of opinion exists concerning the exact route of metastasis. Bland-Sutton thought it was caused by direct implantation: "The ovaries may be pictured as receiving a light covering of cancer cells, as evergreen shrubs are clothed by snowflakes in winter." Majors found the typical cells in the lungs; metastases may therefore be blood-borne. The authors favour the theory of spread by retrograde lymphatic flow.

Surgical Aspects of Polycystic Kidney.

WALTMAN WALTERS and WILLIAM F. BRAANCH (*Surgery, Gynecology and Obstetrics*, March, 1934) write about the surgical aspects of polycystic kidney. The contention that surgical treatment of polycystic kidney is seldom, if ever, indicated is erroneous. Complications with polycystic kidney requiring surgical treatment occur frequently. The estimation of renal function is of fundamental importance in determining the prognosis and the advisability of operation. Because of the anatomical conditions present in the polycystic kidney, retention tests of renal function usually give a better index than excretory tests. Evidence of marked disturbance of function of both kidneys, such as is indicated by a value for urea of 50 to 60 milligrammes or more for each 100 cubic centimetres of blood, usually will contraindicate surgical treatment except as an emergency measure. When complications exist in one kidney which would indicate nephrectomy, it is essential first to determine whether the degree of function of the other kidney is sufficient to sustain life. Bilateral renal deformity visualized by intravenous or excretory urography should serve in many cases to call attention to the possibility of polycystic disease. It should also serve to make evident the comparative degree of function in either kidney and so govern the type and the advisability of operation. A polycystic kidney, when a clinical diagnosis of renal tumour had been made, has been removed not infrequently. The most common complication requiring surgical treatment occurring with polycystic kidney is diffuse or localized infection. Diffuse sub-acute renal infection may have an insidious onset, and there may be but

few localizing symptoms. Renal pain is a common symptom and is usually described as a dull ache, although it may become acute. It may be caused either by excessive renal weight exerting a pull on the renal pedicle, by intracystic or external pressure, or by infection. Puncture or enucleation of one or more large cysts may serve to ameliorate or eradicate pain. Haematuria, usually of moderate degree and limited duration, may become copious and long-continued. Such haematuria is usually the result of intracystic hemorrhage with rupture of the cyst into the renal pelvis. Excision or enucleation of such cysts usually will suffice to control the hemorrhage. Should destruction of the kidney be extensive or accompanied by secondary infection, nephrectomy may be necessary. Other complications observed with polycystic kidney are renal calculus, neoplasm, tuberculosis and hydronephrosis. The value of the Rovsing operation, which was conceived for the purpose of removing pressure by the cysts on the remaining renal parenchyma, still remains undetermined. Theoretically it has much in its favour. Unfortunately, secondary infection or a persistent urinary fistula may develop following the operation, necessitating nephrectomy. If such complications could be obviated, the procedure might well merit further consideration. It is difficult to evaluate the results obtained in the few cases in which the Rovsing operation was successfully carried out. Although many patients lived for a long time after operation, this is equally true in cases in which surgical treatment was not employed.

Sodium Morrhuate in the Treatment of Varicose Veins.

HYMAN BIEGELEISEN (*Surgery, Gynecology and Obstetrics*, November, 1933) discusses the use of sodium morrhuate in the treatment of varicose veins. Sodium morrhuate has passed the first wave of optimism that followed its introduction and the time is now ripe to determine its true value. Sodium morrhuate is an unknown, relatively unstable mixture of sodium salts of the unsaturated fatty acids found in cod liver oil. Its potency diminishes with age and is not uniform. It is occasionally capable of causing slough formation. No local anaesthetic should be added to the mixture. The advisability of incorporating an antiseptic in the solution is open to question. The irritating effect of sodium morrhuate is due to its soapy characteristics, and has been duplicated experimentally by a solution of commercial liquid soap. Sodium oleate, which is one of the fatty acid salts present in sodium morrhuate, has been tested and found to possess sclerotic power. The continued testing of the other fatty acid salts present in the mixture is necessary if a standardized pure product is to be developed.

British Medical Association News.

ANNUAL MEETING.

THE ANNUAL MEETING OF THE WESTERN AUSTRALIAN BRANCH OF THE BRITISH MEDICAL ASSOCIATION was held at the Hospital for the Insane, Claremont, on March 18, 1934. Dr. M. K. Moss, the President, in the chair.

Financial Statements.

The Honorary Treasurer, Dr. F. L. Gill, presented the balance sheet and financial report for the twelve months. These were received and adopted. The financial statement is published herewith.

Dr. T. C. Boyd and Dr. S. E. Craig were reelected as Honorary Auditors.

Office-Bearers.

The President declared the following office-bearers elected for the ensuing twelve months:

President: Dr. R. H. Crisp.

President-Elect: Dr. F. L. Gill.

Past President: Dr. M. K. Moss.

Honorary Treasurer: Dr. Donald Smith.

Honorary Secretary: Dr. L. E. Le Souef.

Members of Council: Dr. H. B. Gill, Dr. H. J. Gray, Dr. J. J. Holland.

President's Address and Annual Report.

Dr. M. K. Moss delivered his address. He said that before he, too, into the dark descended it was his privilege to deliver a short address, and it was the punishment of members to listen to it. He wished to thank his fellow councillors for their sympathetic behaviour during his term of office and would similarly express gratitude to those members who had attended the general meetings and who had assisted to make his year of office no less successful than those that had preceded it.

Dr. Moss went on to say that he wished to refer to a few facts and opinions that had been forced upon him while presiding over their medical Olympus.

The Council was largely composed of men who, if he might pervert biological life history, had bored their way through the soft wrappings of the cocoon of residency into the worm stage of general practice, had laid their little eggs and burst forth triumphant butterflies in the glorious apparel and with the glittering appanage of the specialist. Some, like himself, remained worms. What he would like to impress on them was the fact that most of them had been worms and could sympathize with the vermicular outlook.

The greatest boon that the medical profession had had in Dr. Moss's time was the *Workers' Compensation Act*. This was the manna from heaven for the sustenance of most medical men. He would like to entreat members not to waste this heavenly gift nor, to make a metaphorical cocktail, to kill the goose that laid the golden eggs. Most medical men were just and reasonable in their charges and attendances for compensation cases. Some were only just in their charges, and there was a third category, that was not just in charges nor reasonable in attendance. Before he proceeded further he would impress on them that sometimes the employers insisted on extra visits, and often the employees nursed their injuries and made the most of them. To make his classification of doctors clear Dr. Moss would quote an imaginary case. A lodge patient arrived with a scalp wound caused at his work. If a practitioner was in the first category he put in sutures and told the patient to report in a couple of days for a dressing, and then told him to return in five or six days to have the sutures removed. If the practitioner was in the second category he sutured the patient's wound as before and told him to report three or four times for dressings and then removed the sutures. Number 1 had three visits; number 2 had five or six visits. The men

in the second category treated all patients the same way. They salved their consciences by saying they were protecting both patients and insurance companies. The men in the third category, being neither just nor reasonable, dressed the wounds every day for ten days or longer and possibly suspected concussion or sepsis. The men in this class never had a cellulitis that cleared up after one incision. All their fractures had unusual complications or difficulties, sometimes invisibility by X rays was one of them. They were assiduous in their attention (at five shillings per visit).

These methods must inevitably wreck the Act and leave the honest men stranded, for the companies were not managed by simpletons, and in any attack on the Act it would not be the accounts of number 1 category or even number 2 category that would flame in the Press or provide parliamentary pyrotechnics. Dr. Moss believed that no class of patients, including the very wealthiest, suffered such assiduous treatment as compensation cases at the hands of the Class 3 doctors. So much for the *Workers' Compensation Act*.

There was another phase of medical life that was being borne in upon him. There was a division in the ranks of medical men. The old men tended to regard the young men as upstarts and were not willing to admit that any good thing came out of Nazareth. Similarly, the young men regarded the old ones as "sticks in the mud", "conservatives", and "dug-ins". It was epitomized in the following fable:

"Be ashamed of yourself", said the frog,

"When I was a tadpole I had no tail."

"Just as I thought", said the tadpole,

"You never were a tadpole."

In the medical profession Dr. Moss would like to state the obvious fact that today's young man was tomorrow's veteran. He had been there and believed that each could learn much from the other.

When Dr. Moss came to Perth in 1915 the Branch was a means of getting the journals, and that about summarized its utilities. It had its meetings, but they were very ordinary. Any protest its members might make was a voice crying aloud in the wilderness. In the last nineteen years he had watched it grow. Now it had as appendages, which never would have grown but for the Parent Body, apart and not a part of it: (i) the Medical Defence Fund, (ii) the Medical Benevolent Fund, (iii) the Post-Graduate Association, (iv) two specialist branches (oto-laryngology and urology), (v) district branches all over the State. All these made for unity by making the medical men more class conscious. When he came to Perth first the lodge councils were the natural enemies of the lodge doctors. Now they met, discussed matters of policy, disagreed or, more marvellous still, agreed. One or two material gains had been obtained by meeting the United Friendly Society Council and airing views at round table conferences.

If twenty years ago some members of the Perth Hospital staff had suggested that the deliberations of an elective board of the staff should be considered and followed in making the honorary staff appointments, they would have been regarded as suitable inmates for a mental home, yet such was the case today.

The medical man of Perth was at last getting some of the respect to which he was entitled. Whether this was due to the meteoric brilliancy of the younger set or to the solar steadiness (some might call it lunar lethargy) of the older set, Dr. Moss was in no position to state. The fact remained that the medical profession of Western Australia, as represented by the Western Australian Branch of the British Medical Association, was gradually becoming trusted and respected. Dr. Moss hoped that their body would never do anything to abuse or disturb this trust, but would continue to deal with the problems before it with impartiality, honesty and humanity.

The President then read the annual report, as follows:

Membership.

Membership of the Branch has increased from 250 to 258.

Meetings.

There were nine general meetings during the year with an average attendance of 39.

The annual meeting was again held, by the kind invitation of Dr. James Bentley, at the Hospital for Insane, Claremont.

Clinical meetings were held at the Children's and Perth Hospitals. Both were kindly arranged by the superintendents of these hospitals.

Interesting papers were read by Dr. Gibson, Dr. Hislop, Dr. Frank Gill, Dr. Aberdeen, Dr. H. Stewart, Dr. Male, and Dr. Crisp.

A special meeting was held jointly with the Western Australian Branch of the Australian Dental Association.

A successful post-graduate meeting was held during the first week of October, when Dr. Allan S. Walker, from Sydney, and Dr. C. E. Lindon, from Adelaide, both attended and lectured during the week.

The annual dinner was held at the Palace Hotel, when 53 members were present. The dinner proved a thorough success.

Library.

During the year the library has been moved to the top floor, "Chennell House". I feel that the library is of little benefit to the members of the Association and that the whole question should be raised at an early date to bring the library up to date and to increase its popularity and utility.

Model Lodge Agreement.

The model lodge agreement has been altered during the year to include the doctor's right to charge for fractures requiring hospital treatment or complicated retention apparatus.

It was also agreed, as more extensive examination was required for members entering lodges, that the fee for primary examination for membership of lodges should be five shillings. This has not yet been agreed to by the Friendly Societies' Council.

North-West Medical Services.

Progress has been made in endeavouring to establish an up-to-date medical service for the north-west, but no finality has yet been reached, the desire being to secure substantial financial aid from the eastern States before launching the scheme here.

Council Meetings.

The Council met ten times, members attending as follows:

| Meetings. | | Meetings. | |
|--------------------------|----|----------------------|----|
| Dr. Atkinson | 10 | Dr. Holland | 9 |
| Dr. Crisp | 10 | Dr. Le Souef | 10 |
| Dr. F. Gill | 8 | Dr. M. K. Moss | 10 |
| Dr. H. B. Gill | 10 | Dr. D. Smith | 9 |
| Dr. Gray | 10 | | |
| Federal representatives: | | | |
| Dr. Hadley | 1 | Dr. Paton | 8 |

Workers' Compensation Act.

Together with Dr. Le Souef and Dr. Holland, I visited Kalgoorlie and interviewed the members of the Eastern Goldfields Medical Association and ascertained that no workers' compensation had been paid to the Kalgoorlie doctors, but for thirty-two years the members' fees to the Mines Medical Fund covered hospital treatment as well as medical attendance. It was ascertained that 3,000 goldminers paid three shillings per fortnight to the medical fund, and this amounted to £12,500 divided among eight men.

Although this system is naturally opposed to the principles of the Association, at the request of the Eastern Goldfields District Association we were asked not to press the matter, as it would have the effect of raising the premiums to the mines, while at present the men paid this for their medical services through their medical fund. It was not considered the time was opportune to take further action.

Hospital Agreements.

An excellent agreement, after negotiations between the Wiluna doctor and the Chairman of the Wiluna Hospital Committee, was prepared. This included the principles of the Association and a wage limit and a *per capita* basis, and also for the first time there was a clause requiring medical representation on the Board of Management.

The hospital agreement at Southern Cross, also embracing all these conditions, has been successfully agreed to.

Farmers' Disabilities.

During the year a deputation from the Council, which waited on the Minister, urged that the doctor should share on a *pro rata* basis with other creditors, and it is hoped that some benefit to the country practitioners will eventuate from this.

Lodge Certificates.

At the instigation of the Friendly Societies' Council, a circular has been sent to all practitioners giving the condition of sick leave for lodge members, which also urged that certificates should be given only where the doctor sees the patient.

Workers' Compensation Act—Medical Fees for Treatment of Nurses.

The Council has expressed the opinion and advised members that they are entitled to charge for treatment of nurses who come within the scope of the *Workers' Compensation Act*. The Government Actuary has been advised of this so that he can adjust the premiums for insurance.

Medical Officer for Sporting Clubs.

In response to the Council's inquiry the Federal Council reported it disapproved of medical practitioners acting as honorary medical officers for sporting clubs (the term "sporting clubs", of course, includes racing clubs). All members were advised of this decision.

Matters for Discussion.

The Council proposes at an early date to discuss at general meetings the following subjects: (i) sterilization for eugenic reasons, (ii) treatment of pulmonary tuberculosis, and it is hoped that keen interest will be taken in both subjects.

Treatment of Members of the Police Force.

At the request of the Commissioner of Police the Council has given serious consideration to the preparation of a schedule of fees as reasonable for medical practitioners to charge members of the police force. This will be submitted to general meeting at an early date.

Election of Member of Council, British Medical Association, London.

The Council has recommended the appointment of Professor R. J. A. Berry to represent the group which includes this State.

Suggested Prohibition of the Use of Heroin.

The Director-General of Health, Canberra, forwarded lengthy correspondence on this matter, and after careful consideration the Council resolved it would regret to see heroin eliminated from the British Pharmacopœia.

New Hospital.

Your Hospital Subcommittee has continued to impress upon the powers that be the acute need for a new hospital run on community lines and situated near the University.

Induction of President.

Dr. M. K. Moss then introduced the President for the ensuing year, Dr. R. H. Crisp.

Library Report.

The Library Report was presented by Dr. R. D. McK. Hall and received. Dr. Hall intimated that both he and Dr. J. Gordon Hislop wished to resign their positions of Honorary Librarians. After discussion it was resolved, on the motion of Dr. D. M. McWhae, seconded by Dr. T. C. Boyd, that the Council should consider the question of the library and report to the next general meeting.

Medical Benevolent Association of Western Australia.

Dr. G. B. G. Maitland presented the report of the Medical Benevolent Association of Western Australia. In the report it was stated that benevolent contributions at the rate of two pounds a week had been made during the year to an elderly general practitioner who was permanently incapacitated through myocardial failure. In all £30 had been given. There were 92 members of the Association, and eight of these were life members. Sixty-eight members were financial for the year, and this number included six new members. The bank balance on January 1, 1934, was £275 5s.

It was resolved, on the motion of Dr. H. J. Gray, seconded by Dr. M. K. Moss, that an appeal for increased membership to the Benevolent Fund be made on the back of the Branch agenda paper and that country associations should also be communicated with.

Dr. G. B. G. Maitland drew attention to the difficulty of collecting subscriptions. It was resolved, on the motion of Dr. Maitland, seconded by Dr. A. W. Farmer, that members should be allowed to pay by a combined cheque their Branch subscription and their Benevolent Fund subscriptions.

It was resolved, on the motion of Dr. P. M. O'Meara, seconded by Dr. Syme Johnson, that the Council should

make inquiries into the possibilities of the inauguration of a superannuation fund or of some insurance scheme to support old and infirm medical practitioners.

Committee for Post-Graduate Work.

Dr. A. W. Farmer, the Honorary Treasurer of the Committee for Post-Graduate Work, presented a report of the activities of the Committee for the year ended December, 1933, as follows:

Fifty-nine members attended last year's post-graduate week. Of these, fourteen were country members; one was unfinancial. This is as against sixty-six members for the previous year.

It will be seen from the balance sheet that this year we sustained a loss of £4 14s. 10d.

The subscription remained, as in the previous year, at £2 2s., but the Committee feel that next year it should return to its original figure of three guineas, which is the usual fee throughout the eastern States, where it is much cheaper to conduct such a course. This will enable us to show a profit on the year's activities and also to share with the eastern States in asking an overseas visitor to visit Perth. The eastern States intend more and more to invite famous men from other countries to visit Australia for the purpose of delivering post-graduate lectures, and we, I am sure, would like to share in this benefit.

Dr. L. Male and Dr. B. W. Buttsworth were elected to vacancies on the Committee.

The Anatomy School Subcommittees.

The report of the Anatomy School Subcommittee, which was presented by Dr. H. J. Gray, was received and adopted. The report is as follows:

Financial Statement at December 31, 1933.

| RECEIPTS. | | PAYMENTS. | |
|--|------------|--|------------|
| | £ s. d. | | £ s. d. |
| December 31, 1932— | | | |
| Bank of New South Wales, Current Account | | Printing and Stationery | 39 0 4 |
| Invested Funds— | | Sundry Expenses | 11 11 0 |
| Commonwealth Loans | 1,160 0 0 | Postages <i>et cetera</i> | 59 7 3 |
| Australasian Medical Publishing Company Debentures | 300 0 0 | Assistant Secretary's Salary (including Typing Service and Free Office Accommodation) | 75 0 0 |
| Commonwealth Savings Bank Account | 529 16 6 | Legal Expenses | 5 5 0 |
| F.D.R., Bank of New South Wales | 800 0 0 | Library Account | 13 16 0 |
| | 2,789 16 6 | London Office Account on Fixed Deposits, Bank of New South Wales, for Year's Subscriptions | 324 3 9 |
| Interest— | | THE MEDICAL JOURNAL OF AUSTRALIA, for Year's Subscriptions | 319 10 0 |
| Commonwealth Bonds | 74 8 0 | Anatomy School | 46 13 10 |
| Australasian Medical Publishing Company | 33 18 10 | Travelling Expenses, Delegates to Kalgoorlie | 22 17 6 |
| Bank of New South Wales, F.D.R. | 23 15 0 | Printing and Legal Expenses <i>re</i> Rules | 56 14 8 |
| Commonwealth Savings Bank | 11 8 10 | Premium paid on Commonwealth Loan | 43 2 6 |
| | 143 10 8 | Hobart Congress, Fees paid | 35 17 6 |
| Net Surplus, 1933 Dinner Fund (this Fund is now in Credit £7/18/5) | 3 10 5 | Federal Committee Contribution | 12 4 0 |
| Subscriptions received | 1,023 9 3 | December 31, 1933: Invested Funds on Hand— | |
| Anatomy Subscriptions— | | Commonwealth Bonds | £2,260 0 0 |
| Fees received | 3 3 0 | F.D.R., Bank of New South Wales | 200 0 0 |
| Dental Board | 8 8 0 | Australasian Medical Publishing Company | 300 0 0 |
| | 11 11 0 | | 2,760 0 0 |
| Australasian Medical Congress, Hobart—Fees received | 29 11 0 | Cash on Hand | 34 11 0 |
| | £4,256 1 9 | Bank Balance | 396 7 5 |
| | | | £4,256 1 9 |

We hereby certify that this Statement has been audited according to the books and vouchers submitted and found correct.

(Signed) S. E. CRAIG,

T. C. BOYD,

March 16, 1934.

Honorary Auditors.

(Signed) F. L. GILL,

Honorary Treasurer.

Dental Students. Eight dental students have carried out dissections of the head and neck under the supervision of Dr. Thompson. The examiners in anatomy have reported to the Dental Board that the benefit of the Anatomy School was readily seen in the high marks obtained at the examination as compared with those of previous years.

Members of the British Medical Association. Dissections have been carried out by two members on the head and neck. Other members have been allotted parts, but have not devoted much time in the rooms. There are many applications from both members of the British Medical Association and dentists for the head and neck.

Residents of the Hospital. Since there were many parts available which would not otherwise be used, the Subcommittee granted them to some enthusiastic members of the resident staff without charge.

Medical Students. Two medical students during the vacation did excellent dissecting work.

Use of Rooms. The rooms have been made use of for dissecting parts not supplied by the school, for example, larynges and lungs.

Curator. Dr. Stewart was appointed Curator while Chief Resident Medical Officer of the Perth Hospital. Now that he is leaving, a new curator will have to be appointed. The Subcommittee suggests that the incoming Chief Resident Medical Officer be asked to accept the position.

New Perth Hospital. In any scheme for a new hospital provision ought to be made for a decent dissecting room. The present rooms are inadequate, dark, hot and unhealthy. The Subcommittee hopes that a new hospital will be built as near as possible to the University and that if a new hospital is built the dissecting room might be made at the University as the nucleus of a medical school.

Dental Hospital. There will be room at the new Dental Hospital for satisfactory dissecting rooms. The Subcommittee, however, consider the rooms should be either at the Perth Hospital or the University.

Annual Meeting, Bournemouth, 1934.

An invitation was extended from the chair for any members going to England to attend the annual meeting of the Association at Bournemouth.

Proteosuria.

Dr. Gwynne Williams read a paper on proteosuria; it is hoped that this paper will be published in a subsequent issue.

Vote of Thanks.

On the motion of the President a vote of thanks was accorded to Dr. Bentley and his staff at the Hospital for the Insane for their hospitality and entertainment.

SCIENTIFIC.

A MEETING OF THE SECTION OF NEUROLOGY AND PSYCHIATRY OF THE NEW SOUTH WALES BRANCH OF THE BRITISH MEDICAL ASSOCIATION was held at the Psychiatric Clinic, Broughton Hall, on November 2, 1933, Dr. S. E. JONES in the chair. The meeting took the form of a series of clinical demonstrations by the medical staff of the Psychiatric Clinic.

Ataxia.

A man, aged forty-nine years, gave a history of Neisserian infection eight years ago, associated with an orchitis. The symptoms cleared up under intensive treatment and he remained well until nine months ago when his left ankle joint became stiff and the soles of both feet began to burn. This condition became progressively worse and sensations of vertigo then developed. He had a feeling of constriction round the lower ribs and occasional sharp pains in the back. He became very unsteady and had difficulty in walking.

For the past twenty-eight years he had worked as a ship's painter and docker, using red and white lead in his work. He had been unemployed for more than a year. His previous health had always been good except for a condition diagnosed as lead poisoning, sixteen years ago. He denied alcoholism.

There was some mild mental deterioration. He was rather childish, emotionally unstable and indifferent to his condition. Physically he was in poor condition. Hyperpiesis was present, with a systolic blood pressure of 190 millimetres of mercury and a diastolic pressure of 120 millimetres. The vessels were palpable with increased tension. His teeth were dirty and carious, but there was no evidence of any "blue line" on the gums. The pupils were equal and reacted normally. There was a fine tremor on the lips and tongue.

Hyperaesthesia of the soles of the feet was marked and was also present in a lesser degree in the legs. Sense of passive position and movement was impaired in all the limbs.

His hands were very tremulous, and his gait was ataxic. Coordination was impaired in the upper and lower extremities. Rombergism was present, but there was no alteration in the muscular tonus. The knee jerks were absent, but other reflexes were normal. The blood did not react to the Wassermann test and the cerebro-spinal fluid gave no reaction to all tests.

Post-Traumatic Behaviour Disorder.

A boy of seventeen was shown. When he was eight years old he fell from a bridge and sustained a fractured skull. He bled from the ears and nose and was ill for two months afterwards. A year later he began to suffer from severe headaches which became more intense until eighteen months ago when they were accompanied by nausea, vomiting and giddiness. In April, 1933, he entered hospital and a cerebral decompression was performed. He felt much better after this and was free from discomfort for three months, and then head noises began to trouble him. If he heard a noise for any time, it persisted as an obsession, making him feel desperate and he became uncontrollable, impulsive and liable to injure himself in his excitement. Lately he had become solitary, reserved and unsociable. He was worried by feelings of anxiety and impending harm and was often tremulous.

Mentally he was quite alert, bright and pleasant in manner. Although self absorbed, he was able to give a good account of himself. He complained of head noises of various types in his head and these produced acute anxiety attacks, in which he attempted to do himself some harm.

His physical condition was good and his cranial and deep reflexes were normal.

Since admission to hospital he had had severe bouts of excitement associated with screaming, struggling and attempts to strike his head against the wall. It required several people to restrain him from injuring himself. At times he became childishly petulant, and an attack was likely to be provoked by refusal of some request. Between the impulsive outbursts he was cheerful and well conducted and had quite a pleasant demeanour. During the attack, he talked in a rambling fashion, but it was quite obvious that he was fully conscious and knew exactly what was happening. Sometimes he expressed a desire to go home, at other times he showed a decided antagonism towards his parents. He rarely complained of cephalalgia, his symptoms being rather functional than organic.

Hystero-Epilepsy.

An unmarried woman aged twenty-six years was shown. The family history was that the father died at fifty years of age. He was an alcoholic and bad tempered, from "war injuries". The mother died at forty years of age with heart failure. A brother and a sister were alive and well.

The previous history was that the patient was a dull scholar. She failed in her "Q.C." examination when nearly fifteen, and then worked as a shop hand from fifteen to

seventeen years of age, and as a domestic servant from seventeen to twenty. She was granted the invalid pension when twenty for "nerves", and had not worked since. She had had a disappointment in love when she was twenty years of age—her boy friend married another girl. Her menses were always irregular, she had long periods of amenorrhoea.

When the patient was twelve years of age she took her first "turn"—she was frightened by a bolting horse. She had a second turn six months later and one week after her mother's death. She was upset by the next door neighbour's house being burnt down. The patient could recall one turn being taken while at school.

The patient was well until she contracted influenza. She was then twenty years of age, and working as a domestic servant in the country. She then came to Sydney; her nerves were bad. She had always been tremulous. It was at this time that the patient's boy friend married another girl. The patient was living with her friend, who was an alcoholic. He once attempted to choke the patient, and was violent tempered. He died a year later and during the last five years the patient had lived with a married brother.

The patient had gradually got worse. She had developed choreiform movements as the result of which she had had several bad falls. Three years ago she fractured the bridge of her nose and had two stitches inserted. She also had had three stitches above each eyebrow for lacerations, seven stitches above left wrist, one stitch at the back of her scalp.

The patient did not care about her recovery and felt that she had no future prospects.

The patient was a young woman in a poor state of nutrition. The bridge of her nose was thickened and scarred; she had several small scars on her forehead. The general systems were clear. She had well marked irregular spasmodic bodily movements, and had a tendency to throw herself backwards. The reflexes were brisk. Mentally, the patient was below the average intelligence.

The patient's relatives gave a history of epilepsy from childhood. Since admission to hospital there had been no definite epileptic seizure. The charge nurse reported one major fit with very severe muscular spasm, frothing at the mouth, incontinence and apparently some confusion following. The choreiform movements had been very marked at times and exaggerated by emotional upset or excitement. Her speech was jerky and hesitant and she had had to be spoon fed. Frequently she had nocturnal incontinence. The patient had had several injuries from knocks—a badly bruised eye, lacerated forehead and hematoma of the scalp.

Physically the patient had improved and she was more stable emotionally.

Hysteria.

A woman, aged thirty-one years, a clerk, who was suffering from hysteria, gave a history that her father had *paralysis agitans*. The mother and four brothers and four sisters were alive and well. There was no other known family illness.

The patient was born and reared in the Isle of Man. She was adopted by her grandmother in infancy who cared for her very well. At school, she was not considered backward, although she was irritable and sulky tempered, and had the thumb sucking habit until she was eight years of age.

She became a nurse when seventeen, but gave up training fifteen months later after a slight injury to her knee. The knee completely recovered after a few weeks.

The patient came to her parents after her grandmother's death. She was then twenty-one. The parents left the Isle of Man for Australia when the patient was eight years old. The patient was unhappy in her new home, she fretted and did not get on well with her mother, and she missed the social life. She had to earn her own living. She became a clerk and worked for ten months when she collapsed and said she could not work on account of her rigid knees.

She was treated in the Royal Prince Alfred Hospital for six weeks. There was some temporary improvement after eight months. Two years later she was admitted to Balmain Hospital for eleven weeks for a recurrence of the condition.

For the past five years the patient had been an invalid and was lifted from bed to a couch each day. Her nerves had become worse recently. Tremulousness was marked—her lips quivered, and she complained of heart pains and indigestion. She was very irritable and emotional.

Physical examination showed the patient to be a pale faced young woman. Her nutrition was fairly good. Her heart sounds were accentuated and she had some extra systoles. The lungs were clear. The pupils were equal and reacted to light and accommodation. She had a left lateral strabismus with failure of convergence. The tongue was tremulous and slightly deviated to the left on protrusion. The lips had a quivering movement, and the patient spoke with a peculiar somewhat staccato articulation. There was some dulling of pain sensibility in the lower right extremity.

There was marked wasting of muscles above and below the right knee and there was a good deal of muscular rigidity with fixation of knee joint in extension.

There was slight flexion of the knee—this could be obtained with passive movement. There were loud crepitations on movement. The knee jerk was exaggerated on the right side with a slight plantar flexion on both sides.

The patient was pleasant and rather infantile in manner. She was childishly emotional and made a display of symptoms. She sought attention for her condition and could offer no reason for the persistence of her deformity and appeared unconcerned about the future.

Ataxia with Diplopia.

A man of forty-two years of age had a severe attack of influenza in 1919, collapsing in the street, having lost power in all his limbs. In 1924, while straining to lift a load of wool he felt "something snap" in the left elbow, which became swollen and tender, with "pins and needles" in the distribution of the ulnar nerve.

In 1931 he was knocked down by a motor car and suffered concussion. Shortly afterwards the paræsthesia returned and had persisted ever since. He also developed a burning sensation in the left side of the neck and this radiated down behind the left shoulder into the back. This was still present and was aggravated by turning the head to the left and looking upwards.

In December of 1931 he was again concussed in a car accident and after this his neck "locked". This was very painful and he was unable to move his head for a time.

In April of this year a more acute condition developed with vomiting, which persisted for three days. He had slight tinnitus in the right ear, which was relieved by syringing, and he also complained of diplopia. This last symptom was present in all planes and lasted ten days after which it only occurred on looking to the left. Associated with these symptoms was numbness of both feet and this had not yet disappeared.

He had some mild feelings of vertigo at times, but they were not marked, and he rarely suffered from headaches.

The patient was a tall man in fairly well nourished condition. The cardiac and respiratory systems were clear. The systolic blood pressure was 112 millimetres of mercury and the diastolic 86 millimetres. Nothing abnormal was discovered in the urine. The Wassermann test gave no reaction.

In the examination of the nervous system the following facts were noted.

(a) *Cranial Nerves*: The patient complained of occasional tinnitus and there was diplopia in looking to the left, horizontally, with the image on a higher plane. This was associated with a definite feeling of discomfort. There was a coarse nystagmus on looking to the left, and a slight fine nystagmus to the right. Other ocular movements were normal and the pupils reacted normally to light and accommodation.

(b) *General Sensory Functions*: There was loss of tactile sensibility in the left leg and foot and to a lesser

extent in the thigh. This was not definite in distribution. Tactile sensibility was also affected in a glove area in the left hand. Painful sensibility was diminished in the distribution of the left ulnar nerve in both feet.

(c) *General Motor Functions*: There was gross incoordination in all limbs and Rombergism was present. His gait was normal and there was no alteration in muscular tonus. No "rebound" phenomenon or fall movement was elicited.

(d) *Reflexes*: The knee jerks were absent, but the other reflexes were not altered.

Aphasia.

A man of thirty-four years of age was suffering from aphasia. Three years ago he had five "fits" which were not associated with marked convulsions. He was under treatment for two years afterwards for renal trouble, which was believed to be responsible for the fits.

Six months ago his speech became progressively impaired until it was almost unintelligible. Recently he had complained of severe headaches, and had been vomiting about once a week for several months. One month prior to admission to hospital he developed a slight weakness in both arms. He felt very well only for this.

He understood what was being said to him and at times he replied quite clearly, at other times he was almost entirely unintelligible, stammering and using the wrong words. He was not unduly distressed by his condition and remained bright and cheerful.

His general physical condition was good. All the reflexes were normal, except for a slight exaggeration of the knee jerks. In spite of his dysarthria, he could give quite a satisfactory account of himself.

The blood did not react to the Wassermann test. The cerebro-spinal fluid on examination showed three cells, a positive globulin reaction, a pink coloration with the Takata Ara test, failure to react to the Wassermann test, and a gold sol curve of 1211000000.

Hysterical Paraplegia.

A girl aged thirteen, who was suffering from hysterical paraplegia, was shown. Her father and mother were alive. The father was a factory hand earning about £3 per week. He was rather bad tempered and used to drink. Three brothers and three sisters were alive and well.

The patient was the third child of a family of seven. She had a delicate infancy—she had wasting disease and was in the Children's Hospital for six weeks when ten years of age, and was said to have had pneumonia with rheumatism in the legs. She was a dull scholar and was mostly in trouble with the teacher for talking.

The present illness started fourteen months ago. The patient fell downstairs in her home, went outside and played and then got sick. She had not walked since. She had no pain in her legs and could not feel much.

The patient was treated in the Royal Prince Alfred Hospital for two weeks with massage and electricity, but she seemed to get worse. She then developed a bend in her back, and had been attending Sydney Hospital outpatient department, without any improvement.

The patient was a pale faced girl, under developed for her age and infantile in appearance. She had a marked hump on her back and her head was set low down between her shoulders, which were elevated. She was in a poor state of nutrition. The respiratory and cardiac systems were clear. The pupils were equal and active.

The patient had a widespread analgesia involving the chest and the upper and lower extremities. She adopted a peculiar attitude: she had diffuse kyphosis with her back bent forward from the coccyx and lateral curvature of the spine to the right. The pelvis was tilted, the patient sat on right hip with the left leg slightly drawn up. She had a paraplegia of the lower extremities with a wasting of the calf muscles. The reflexes were brisk and there was no ankle clonus. If the patient was unsupported, the legs went from under her. With assistance she could take

a few steps. Her gait was very awkward and tremulous and she had difficulty in lifting her feet from the ground.

The patient had been quiet since admission, she reacted in a childish manner to examination. She had improved physically, but there was little improvement in condition of the legs.

Cerebral Tumour.

The history of a woman, aged sixty-one years, was read. Her condition was described as a cerebral tumour. The patient's father died at seventy years of age of malignant disease of the stomach and he was an alcoholic. Her mother died at fifty-four of delusional melancholia. Ten years ago the patient had had hysterectomy performed for a uterine prolapse, and six years ago the left breast was amputated for malignant disease.

The present illness commenced three months ago. The patient began to vomit at irregular intervals; the vomiting was not projectile. An X ray report showed nothing abnormal in the alimentary tract and no sign of a pituitary tumour; there was slight glycosuria. The patient improved until one week ago, when a decided mental change took place. She became slower in cerebration and was not able to think sufficiently to answer a question of the simplest type. She tended to repeat a word and to make the same reply to different questions. She lost control of the sphincters.

On admission to Broughton Hall the patient was very dull, apathetic and unresponsive. She exhibited considerable poverty of ideation and impaired cerebration. Her memory was grossly impaired, and she was out of touch with her environment. She had to be cared for and spoon fed. She vomited occasionally and had urinary incontinence. She was of stout build; the respiratory and cardiac systems were clear. She had obstinate constipation.

The neurological examination revealed unequal pupils, moderately dilated and slightly oval in shape. The pupils were inactive at the time of the patient's admission to hospital, but later became active to light and accommodation and consensually. External strabismus of the left eye was present. There was no impairment of ocular movement, but lateral nystagmus was noted.

General sensory functions were apparently good, but the patient did not cooperate.

The patient was bedridden and had fine tremor of the right hand and irregular choreiform movement of the left arm. She had a grasping reflex in both hands on stroking the palms.

The knee jerks were exaggerated; on the left side they were clonic in type. An extensor plantar response was present on both sides, but was more marked on the left with withdrawal movement. Double ankle clonus was present. The blood did not react to the Wassermann test.

It was explained that the patient had remained very dull and unresponsive. The fundi were mildly congested, but later papillitis was more pronounced, with small retinal hemorrhage. She vomited occasionally. For a time the patient became alert mentally and the neurological signs were less evident, but she lapsed again into a dull lethargic state. She developed pronounced papillitis. She assumed an attitude of flexion of the lower extremities with marked spasticity.

The patient's physical condition gradually deteriorated, and she collapsed and died six months after the onset of symptoms.

DR. OLIVER LATHAM added the following comments on this case. At the *post mortem* examination large cysts were found all over the brain and one cyst in the cerebellum. When he first examined fluid from this specimen he was not aware that the patient had had a malignant growth removed from the breast six years previously, and at first he had thought that the cysts might be of some other origin. It was commonly taught that newgrowths in the form of cysts were more common in the cerebellum and that the symptoms were relieved by puncture, but that a small node or nubbins was left. An effort must be made to remove this nubbins. Professor Dew had recently removed an enormous cyst in the left frontal

region, which was due to a ganglioneuroblastoma. Any kind of tumour might form cysts in the brain. Dr. Prior had once sent him a specimen in which there were numerous globules in the cyst and in the cerebro-spinal fluid when the cyst had ruptured. A section of the brain in this case showed cells which had a tendency to become vitreous and swollen to an enormous size, visible to the naked eye, and also other tumour masses quite vitreous. He suggested that the present specimen was an example of newgrowth with gelatinous degeneration; that it was a case of multiple carcinomatosis of the brain, and not a hydatid of the brain, nor abscesses. Professor Dew held that there was rarely hydatid of the brain without a deposit on the heart valves. Dr. Inglis had given him a specimen of abdominal carcinoma, and the cells of this had shown vitreous degeneration.

Dr. Latham had subsequently, on histological examination, found the condition in the present case to be multiple carcinoma, the cysts being lined almost in their entirety with a single "band" of carcinomatous cells, averaging eight cells deep. Hassin and Singer discussed this condition and stated that the carcinoma might infiltrate or simply exist in the brain without any reaction whatever. The cyst fluid might consist of blood plasma—and this appeared to be the condition found in the present case—a highly albuminous fluid with swollen tumour cells.

Cerebral Syphilis.

A young man, twenty-five years of age, was first admitted to hospital in May, 1932, with a history of infection two years previously. He was under treatment for twelve months for this. He had five epileptiform seizures, and his memory became considerably impaired; at times he was very unsteady, and three weeks before admission he was in an extremely confused condition.

Mentally he was very dull and disinterested, with impairment of recent memory and poverty of ideation. His physical condition was good and the pupils reacted normally. There was no Rombergism or ataxia. The deep reflexes were exaggerated.

The Wassermann test applied to the blood gave a positive reaction, as also did the cerebro-spinal fluid, which showed two cells, a positive globulin and Takata Ara reaction, and a bicolour gualac curve of 232321000.

The patient was inoculated with malaria and had nine rigors, after which he became more alert and responsive, and was discharged as relieved.

He was readmitted to hospital in August, 1933. He had had a seizure a few days prior to admission and had been confused and restless and was taken to a local hospital, where he became so unsettled that he was controlled with difficulty.

On admission he was dull, with some confusion, and was rather sullen in manner. There had been no change in his general condition since the previous examination.

The Wassermann reaction remained positive in the blood and the cerebro-spinal fluid. On August 19, 1933, examination of the latter showed 22 cells, positive globulin and Takata Ara reactions, with a gold sol curve of 5555432100, whereas on October 5, 1933, the Wassermann reaction was only partially positive; only one cell was present, the globulin test gave no reaction, the Takata Ara reaction was still positive, but the gold sol curve had changed to 2332100000. During the interval between the two examinations the patient had been inoculated with malaria, but failed to react, and on October 1, 1933, he had a convulsive seizure, with loss of power in the left side. This was followed by a succession of fits. Since then he has been very confused, but this was now clearing up and he had regained power in the affected side.

MEDICO-POLITICAL.

A MEETING OF THE TASMANIAN BRANCH OF THE BRITISH MEDICAL ASSOCIATION was held at the Tasmanian Museum, Hobart, on June 12, 1934, Dr. W. E. L. H. CROWTHER, the President, in the chair.

Annual Meeting of the British Medical Association, 1935.

The Honorary Secretary (Dr. J. H. B. Walch) announced that Dr. D. H. E. Lines and Dr. G. H. Hogg had been appointed representatives of the Tasmanian Branch on the General Executive Committee for the holding of the British Medical Association annual meeting, 1935, at Melbourne.

Dr. Lines read correspondence that he had received from the Committee in regard to the entertainment of visiting members. The meeting decided to instruct the Council to invite as many members as possible to visit Tasmania, and it also requested the Branch representatives to formulate plans for the entertainment of such members as should accept the invitation.

Friendly Society Lodge Practice.

DR. E. BRETTINGHAM MOORE and DR. A. W. SHUGG spoke on lodge agreements and the following motion was carried as a recommendation from the Branch Council:

That a conference be arranged between representatives of the Branch and the friendly societies with a view to amending the existing Model Lodge Agreement.

After discussion the meeting resolved that the friendly societies should be approached with a view to an arrangement that insured workers should not be eligible for treatment under the lodge agreement for injuries in regard to which such patients were covered by insurance. If, however, the cost of treatment should exceed £25, the amount of insurance, the lodge agreement should begin to operate again.

The President, Dr. W. W. Giblin, Dr. C. N. Atkins, and Dr. T. H. Goddard were appointed a committee to carry out the terms of the resolution.

Child Welfare Clinics.

DR. N. B. G. ASSORT pointed out that the nurses at some of the child welfare clinics were in the habit of making diagnoses and prescribing treatment for sick children. After discussion the meeting decided to instruct the Council to write to the Central Executive of the Child Welfare Association, asking for a closer cooperation with the medical profession, as complaints had been received about the activities of some of the Association's nurses.

NOMINATIONS AND ELECTIONS.

THE undermentioned has been elected a member of the New South Wales Branch of the British Medical Association:

Lipscomb, John Francis, M.B., B.S., 1933 (Univ. Sydney), Wiston, Marathon Road, Darling Point.

THE undermentioned has been elected a member of the Tasmanian Branch of the British Medical Association:

Maclean, Leonard Allan, Mental Diseases Hospital, New Norfolk.

Medical Societies.

MELBOURNE PÆDIATRIC SOCIETY.

A MEETING OF THE MELBOURNE PÆDIATRIC SOCIETY was held at the Children's Hospital, Carlton, on Wednesday, June 13, 1934, Dr. H. C. COLVILLE, the President, in the chair. The meeting took the form of a series of clinical demonstrations.

Schlatter's Disease.

DR. CHARLES OSBORN showed two cases of Schlatter's disease. The first patient was a boy of twelve years, who fell and injured his knee some months previously. Prior to the injury he was quite normal, but subsequently he developed pain, tenderness and swelling over the tuberosity of the right tibia. Radiologically the diagnosis of osteochondritis of the tibial tuberosity was confirmed.

The second patient was a girl of thirteen years, who for six months had noticed a tender swelling below the right knee, which ached at night time and was getting progressively larger. Again the diagnosis was confirmed radiologically.

Dr. Osborn said that osteochondritis of the tibial tuberosity was first described by Osgood in 1903 and by Schlatter in 1908, and although both these observers regarded trauma as the essential cause, there was frequently no history of it, as in the second case. Treatment was simple, as most patients recovered spontaneously, but they did seem to be better if kept on a back splint for six weeks. He said that the custom of labelling these diseases by proper names was an unfortunate one, as it only obscured the fact that Schlatter's disease, Perthes's disease, and Köhler's disease were all really the same. Osteochondritis could affect any growth centre.

Osteochondritis of the Ischio-Pubic Ramus.

Following on his remarks regarding osteochondritis, Dr. Osborn showed two patients who were suffering from osteochondritis of the ischio-pubic ramus.

The first patient was a girl of ten years who had complained for some months of pain in the left hip, especially at night time. She had gradually developed a limp and had been referred by the family doctor to hospital with a diagnosis of tuberculosis of the hip joint. On examination there was limitation of movement in all directions, but especially of abductions and internal rotation, so that Dr. Osborn thought the case was one of Perthes's disease. X ray examination, however, showed that the hip joints were normal, but that there was a condition of osteochondritis of the ischio-pubic ramus.

Dr. Osborn's second patient was a boy of eight years with a similar history. He had limped for over twelve months with vague pains in the lower part of the leg and knee, which occasionally awakened him at night. The movements at the left hip were free, although full abduction and full internal rotation produced slight pain. Rectal examination revealed a smooth, painless swelling of the left ischio-pubic ramus, and again a radiogram revealed the condition of osteochondritis of the growth centre.

DR. COLIN MACDONALD said that all these cases of so-called idiopathic osteochondritis were very closely simulated on occasions by tuberculous, by syphilitic, or by coccal infections, and he therefore thought it unwise to be too dogmatic in the early stages. Ischio-pubic osteochondritis was first described in 1924, but only ten cases in all had been reported, all from German or Scandinavian sources. All growth centres had numerous deviations from the normal, not necessarily pathological. Dr. Macdonald thought that these two cases were essential osteochondritis of the ischio-pubic ramus, but he would delay being positive until the clinical course had been watched for some time.

Hypertelorism.

Dr. Osborn then showed a girl of four years whom he had first seen at the age of one year because of deformity of the skull and of mental retardation. He next saw her when she was two years old, and the condition was then the same, except that the parents thought the sight was affected. Examination then revealed that she had a double optic atrophy and an opacity in the right cornea. Now at the age of four years her mentality was normal and the deformity seemed less marked. The prominent forehead, the broad flat nose, and the divergence of the eyes were all characteristic of hypertelorism and there was typical radiological confirmation in the marked overgrowth of the

lesser wing of the sphenoid bone. He showed the patient because usually the deformity was bilaterally symmetrical, but this case was asymmetrical. Corneal opacities as in this case had been reported, but optic atrophy, while common in oxycephaly, was very rare. The mental condition was usually normal, and although in the earlier years this child seemed subnormal, there was no suggestion of that now.

Pseudo-Pancreatic Cyst.

DR. R. M. DOWNES showed a girl of eight years who had been in hospital for three weeks. Four months previously, while playing at home, she had fallen over and immediately complained of great abdominal pain. She struggled home to bed, where for four days she had a raised temperature; she looked pale and shocked and complained of pain in the upper part of the abdomen. After seven days she recovered. One week later she again developed abdominal pain and vomiting and was confined to bed for a few days. In the next two months she had four more attacks, and in the last of these she was admitted to hospital with abdominal pain, vomiting, tenderness and rigidity in the upper part of the abdomen, where a mass was palpable slightly to the left of the mid-line and fixed to the posterior abdominal wall. After observation for a few days the condition subsided and she went home. One month later she had a more severe attack still and was again admitted to hospital, and laparotomy was performed. The omentum was covered with organized lymph and the peritoneal cavity contained some free brownish fluid. No mass could be found. The appendix was normal. Drain tubes were inserted to the pelvis and to the lesser sac, and her recovery was uneventful. The fluid was found to have a strong diastatic action, but no tryptic action, so that probably it was of pancreatic origin. There was no digestion of the wound. Dr. Downes thought that the mass which was first palpated was a pseudo-pancreatic cyst which, in her last attack, had ruptured.

Intrathoracic Tumour.

DR. H. DOUGLAS STEPHENS showed a baby girl from the Riverina, aged fifteen months, with a history that from the age of six months she was subject to attacks of wheezing occurring about every six weeks and lasting for a few days. One such attack terminated in bronchopneumonia when she was in hospital for three weeks. Since the age of nine months she had had a slight cough with occasional attacks of coughing at night time. When she became exerted she suffered from some cyanosis and dyspnoea. There was no difficulty in swallowing, and the progress of the baby had been otherwise normal. On admission to hospital two months previously examination revealed a large child with a group of dilated veins over the right side of the upper part of the chest anteriorly. The right side of the chest moved on respiration much less than the left side. The percussion note was very dull over the right upper lobe both anteriorly and posteriorly, and the breath sounds were much diminished over this area also. The liver margin extended to one finger's breadth below the costal margin. The spleen was impalpable and there were no enlarged glands. There was no reaction to the Casoni, Wassermann or von Pirquet tests.

Blood examination revealed a red cell count of 4,700,000 per cubic millimetre, the haemoglobin was 90% of the normal, and there were 13,200 white cells per cubic millimetre, of which 73% were lymphocytes. A radiogram revealed a large area of increased density in the position of the right upper lobe, which appeared continuous with the mediastinum. On barium meal examination no abnormality of the oesophagus was found. The radiological diagnosis was one of an innocent tumour of mediastinal glands rather than malignant disease.

At the time of the meeting the baby was 0.9 kilogram (two pounds) heavier than on admission to hospital. Despite two intensive courses of deep X ray therapy the clinical and radiological appearances were unaltered.

Dr. Stephens discussed the various tumours of the thorax in childhood and thought it most likely that the child had either a dermoid or a thymoma.

DR. KAYE SCOTT, of the Melbourne Hospital, who applied the deep therapy, also discussed intrathoracic tumours. He said that thymomata were usually bilateral and of butterfly wing appearance radiologically. The non-response to X ray therapy excluded malignant disease, and he thought the most likely diagnosis was dermoid and that the correct procedure was surgical intervention.

Obituary.

ALEXANDER JARVIE HOOD.

MANY generations of resident medical officers at Sydney Hospital have reason to remember the encouragement they received from the late Sir Alexander Jarvie Hood; they will remember his kindness and his courtesy. They heard of his death with regret, though, on account of his ill-health, they were not surprised. But his influence extended beyond the walls of one institution, and "Jarvie", as he was usually called by those who held him in affectionate esteem, was never appealed to in vain. Even in the busiest years of his life he always found time to give of his best when it was needed, and wherever he went he took comfort and assurance with him.

Alexander Jarvie Hood was born in Glasgow in October, 1860; he was the son of William Hood, company manager, of that city. He was sent to Glasgow High School and became an undergraduate in medicine at Glasgow University in 1878. Little is known of his career as a student, except that he took a high place in the lists. He associated himself with the Medico-Chirurgical Society, The Diabetic Society and The Liberal Club (in after-life he became a conservative). After graduation as Bachelor of Medicine and Master of Surgery in 1882 he obtained a resident appointment in the Glasgow Western Infirmary. Soon after this he decided to come to Australia and he settled on the Clarence River at a town called Rockey-mouth, but now known as Maclean. It was not long before he decided to move to Sydney, and in 1893 he was appointed honorary assistant surgeon at Sydney Hospital. His association with Sydney Hospital was long and honourable; he became honorary physician in 1895 and consulting physician in 1920. His devotion to the welfare of his patients was extraordinary; he won their confidence and held it. His relations with his resident physicians were always happy; nothing was ever a trouble to him. His mind was receptive—he was no egotist, nor was he self-opinionated. With the qualities that he had, and with his ease and charm of manner, it was not to be wondered at that his private practice became large and that his advice was sought by all sections of the community. He was specially good to nurses; they sought his advice when

they were ill, and he would leave his private patients at a moment's notice to come to the bedside of a sick nurse. In 1921 he was created a Knight Bachelor by His Majesty the King, an honour that his friends felt was richly deserved.

Hood took an interest in army medical matters. He held a commission as Lieutenant-Colonel in the Australian Army Medical Corps and was awarded the Colonial Auxiliary Forces Officers' Decoration. During the Great War he was visiting physician to the Randwick Military Hospital. He was for many years official visitor to the Mental Hospitals Department of New South Wales. For thirty years he was medical director of the City Mutual Life Assurance Company. He was also a member of the Council of the War Memorial Hospital, a member of the Council of Saint Andrew's College within the University of Sydney, a member of the Council of the Presbyterian Ladies' College, Croydon, and for many years Advisory Medical Officer to the Commonwealth Bank.

He never married; he was fond of his garden and devoted to his library, where he spent most of his spare time. He retired from practice in 1932 and seldom appeared in public after his retirement. He has left a name that will be honoured for years to come, and a grateful memory of one who adorned his profession.

Dr. Robert Beith writes:

Sir A. Jarvie Hood was born in Glasgow and obtained his early education at the High School of that city—a school that has turned out many pupils who in after life were prominent in different walks of life. He was a good and faithful scholar and left school with much credit, both as to intellect and character.

After a short period in a business office in the city he, having already passed the preliminary examination, became a student of medicine in the University of Glasgow in 1878, which, by the way, was the year of

the failure of the City of Glasgow Bank, an occurrence which caused great consternation and distress among both medical students and others for a time. He was a student of note during the whole of his course, and his name appeared high up in the pass lists in the examinations in all subjects; if there was one department of his studies in which he took more interest than another at that time, it was surgery, the teacher being Professor G. H. B. Macleod (afterwards Sir George). He gained the degrees of M.B. and C.M. in 1882.

During his student days he spent much time in the wards of the Glasgow Western Infirmary and frequently acted as *locum tenens* for resident officers of that hospital; the wards he frequented most were those of Sir George Macleod and Dr. Gavin Tennant, the latter being a physician of great reputation in the west of Scotland.

At the close of his course he was appointed resident medical officer of the Leith Infirmary, and he remained there for rather more than six months. During this time he did excellent work and earned the thanks and the good wishes of the hospital committee.



He left Leith when he was appointed house surgeon to the wards under Sir George Macleod; here he was exceptionally happy, as Sir George was not only his chief, but also his firm and lasting friend. While in this position he obtained much experience both in the wards and with Sir George in his private practice, as he was one of the main surgeons of the west of Scotland and a Surgeon-in-Ordinary to the Queen.

Having been for six months a resident officer on the surgical side of the infirmary, Sir Jarvie, according to the usual custom, was transferred to the medical side and took up work under Dr. Gavin Tennant, a man of wide general and consulting practice in Glasgow and its surroundings. Dr. Tennant was one of the most genial and lovable men, and one who had a profound knowledge of drugs and their action. Sir Jarvie, throughout his whole course, had shown a decided aptitude towards therapeutics; thus his position with Dr. Tennant was most fortunate, as he practised there those methods of medical care and treatment that were to serve him so well in after-life. He also was able to practise and extend the methods of physical diagnosis that had been so carefully inculcated by Sir William Gardiner in his class and clinical lectures in medicine. Sir Jarvie's loyalty to and enthusiasm for his teachers were so great that he quickly profited by their precept and example, and so became the all-round physician that he was.

During all the time of his university course and his residence in the infirmary Sir Jarvie had such a genius for making and keeping friends that he was deservedly popular among all with whom he came in contact; he was always helpful to those who required assistance and was invariably considerate of the feelings and even prejudices of others.

He took an active part in all the committees and associations within the university.

Dr. Archie Aspinall writes:

The death of Sir Jarvie Hood reminds us of the fleet passage of time and reduces the number, already too small, of medical men from the homeland who, by their example, exerted a great influence for good in the medical profession of New South Wales.

Unfortunately, after retiring from practice, his health failed and he was unable to enjoy a well earned rest. Sir Jarvie was long associated with Sydney Hospital. Punctual to the minute, his keen, almost eager look as he entered the ward to do his rounds will be remembered by his house physicians. As he went from bed to bed he brought cheerfulness and joy to his patients, and his interest in every detail of treatment insured a high nursing efficiency in his wards. Sick nurses asked to be placed under his care.

Ever interested in younger men, not a few medical men who have made good in Macquarie Street owe much to his encouragement and introduction into practice.

Sir Jarvie Hood was idolized by his patients both rich and poor; he made no distinction between them, but gave of his best to all.

An early riser, he was always present when his private patients were operated on, and was an excellent assistant, no doubt due to his surgical experience in earlier years of practice. Many a young anesthetist at 7 o'clock on a winter's morning at a private hospital envied his freshness and tirelessness.

He had a wonderful memory and never forgot a name or face. Although so much in the public eye, he was by nature sensitive and in many ways really shy. Sir Jarvie was an active supporter of various activities of the Presbyterian Church, especially those connected with education.

He was a great lover of animals, and until the pressure of work forced him to have a motor car, his private cab and horse were a feature of the city. Many former resident medical officers at Sydney Hospital will remember being taken for a drive with him after he had finished his rounds, and being presented with a delightful cigar meanwhile. This could only be smoked in comfort when clear of the city, as one had constantly to raise one's hat

as Sir Jarvie returned the salutations of those passing. He seemed to know and be known by everyone.

A charming host, he was at his best sitting by the fireside in his well stocked library after dinner with a few friends, when his ready wit, appreciation of a good story, and personal charm insured a delightful evening for his guests.

As the years go by his memory will not fade.

JOHN HENRY BENNETT.

We regret to announce the death of Dr. John Henry Bennett, which occurred on June 22, 1934, at Auburn, Victoria.

ROBERT STANLEY ENEVER TODD.

We regret to announce the death of Dr. Robert Stanley Enever Todd, which occurred at Neutral Bay, New South Wales, on June 28, 1934.

Post-Graduate Work.

POST-GRADUATE LECTURES IN SYDNEY.

THE New South Wales Permanent Post-Graduate Committee announces that Professor David Barr, Professor of Medicine, Washington University, St. Louis, United States of America, will deliver two post-graduate lectures in Sydney as follows:

Tuesday, August 7: "Thyreotoxicosis."

Thursday, August 9: "The Relation of the Parathyroid Glands to Calcium Metabolism."

The lectures will be delivered in the Robert H. Todd Assembly Hall, British Medical Association House, 135, Macquarie Street, Sydney, at 8.30 p.m.

The fee for the two lectures is one guinea. It is requested that those proposing to attend should send their names as soon as possible to the Honorary Secretary, 225, Macquarie Street, Sydney.

COURSE OF INSTRUCTION FOR THE PRIMARY FELLOWSHIP EXAMINATION, 1934.

THE New South Wales Permanent Post-Graduate Committee announces that a course of instruction in anatomy and physiology for the primary fellowship examination of the Royal College of Surgeons of England will be held in Sydney at the Medical School, commencing Monday, July 23, 1934. Lectures and demonstrations will be given daily in the late afternoon.

The fee for the course is twenty guineas for post-graduates and ten guineas for undergraduates. Application should be made as soon as possible to the Honorary Secretary, New South Wales Permanent Post-Graduate Committee, 225, Macquarie Street, Sydney.

Correspondence.

THE PERSISTENCE OF TUBERCULOUS INFECTION.

SIR: Your article in the last edition of your journal, entitled "The Persistence of Tuberculous Infection", is timely, although only bringing to mind features of this disease which are well known but often forgotten.

You say: "Tuberculosis presents problems that have puzzled pathologists and clinicians since the days of Koch." I would say that the difficulty of understanding the bacteriology of the inflammatory conditions, which give rise to the clinical signs and symptoms of tuberculosis, has been increased by the discovery of Koch, of the relationship of his bacillus to this disease.

There are several indisputable facts which cannot correlate the present accepted bacteriological knowledge of this disease. Although Koch's bacillus is definitely associated with the bacteriology of this disease, tuberculous inflammation is the result of bacterial toxins, and Koch's bacillus does not produce toxins. Koch's bacillus cannot, therefore, be the direct causative agent in the production of tuberculous pathology.

I would like to bring before the notice of your readers two simple experiments which can be carried out in any well equipped laboratory.

(1) If healthy guinea-pigs are injected with pure cultures of Koch's bacillus, and in the course of four to six weeks, when the animals are prostrated with the disease, their spleens are removed in such a way as to avoid extraneous bacterial infection and are pulverized in a mortar with a little sterile broth, and some of this broth-spleen mixture is sown in broth, after a few days to a week's incubation at body temperature, there will appear greyish colonies in the culture medium. On microscopic examination these colonies will be found to be made up of cocci. These cocci produce toxins in the broth-culture medium.

(2) If other healthy guinea-pigs are injected with these cocci, they develop all the symptoms of acute tuberculosis. If they survive the initial toxæmia and their organs are examined after several weeks, typical tuberculous foci will be found and the bacillus of Koch will be found in these foci.

The inference drawn from these experiments, together with the knowledge that Koch's bacillus does not produce toxins, is that Koch's bacillus is only a part of the bacteriological picture of tuberculosis. The presence of the bacterium of tuberculosis in the form of Koch's bacillus does not give rise to the disease. It is only when it takes the form of the toxin-producing coccus that the classical symptoms appear. The capacity of Koch's bacillus to lie dormant in the tissues, unaffected by the tissues' lytic agents, explains the "persistence of tuberculous infection", the subject of your article in the Australian journal.

This conversion of Koch's bacillus into a toxin-producing coccus also explains the hitherto unknown source of the toxins which bring about tuberculous pathology.

From this revised conception of the bacteriology of tuberculosis there arises a rational scientific means of combating the pathological results of tuberculous toxæmia with a sure means of overcoming tubercular infection.

The bacillus of Koch, by reason of its fatty capsule, is capable of resisting the bacteriolytic agents of the body, and therefore cannot be destroyed by the body resources. The coccal form of the causative bacterium, to whose toxins the pathology of the disease is actually due, is devoid of this protection, and is vulnerable to the bacteriolytic powers of the tissues and phagocytic leucocytes.

The toxin produced by the coccus can be overcome by an antitoxin serum produced in the laboratory in the same way as diphtheritic antitoxin.

Injections of tuberculin appear to bring about the conversion of Koch's bacillus in the infected body into the coccal form, as it is well known that tuberculin is only toxic when injected into bodies infected with tuberculosis, and in the first of the above animal experiments if, when the tuberculous guinea-pig is prostrated with the disease, it receives a large injection of tuberculin, the coccal infection in its spleen is greatly increased.

I hope that these few words will serve to throw light on hitherto unknown facts concerning the bacteriology of tuberculosis. I hope that many of your readers will carry out the simple experiments outlined, and they can in this way assure themselves that Koch's bacillus is only a

partial explanation, and the least important from clinical and therapeutic points of view, of the bacteriology of tuberculosis.

With this conception of the causative agents of the disease it is possible by means of an antitoxic serum, an anti-coccal vaccine and tuberculin, to completely and with safety eradicate the bacteria of tuberculous infection. Having overcome the causative infection, the ordinary processes of tissue repair the signs of the disease. It must always be remembered, however, that if the pathology has reached such a stage that repair cannot follow the removal of the causative agents, the body no longer being a functioning mechanism, it must succumb, not to the disease, however, but to the mechanical results of the disease processes.

Yours, etc.,

EDWARD HENTY SMALPAE,
M.B., Ch.M. (Syd.), F.R.C.S. (Eng.).

Hengrove Hall,
Macquarie Street,
June 17, 1934.

QUININE AMBLYOPIA.

SIR: Quinine amblyopia, though a well known condition, is sufficiently rare to be worthy of record, not because of its direct ophthalmic interest, but so that general practitioners may be reminded that such a condition exists and thus be the more careful when using quinine.

I saw this woman on March 29, 1934, and she gave me the following report from her doctor: "This patient had an incomplete abortion in January last and was ordered quinine hydrochloride, ten grains, three doses to be taken at two-hourly intervals. Immediately after the third dose she collapsed and became cyanosed. She soon recovered from the collapse, but was then found to be totally blind, with widely dilated pupils. In a couple of days she regained some sight, but with very restricted fields. Colour vision returned in about three weeks." On examination I found the vision in the right eye was $\frac{1}{2}$, and that in the left $\frac{1}{4}$ partly, but her fields were very small. Her disks were white and her retinal vessels small. There is a condition of optic atrophy present, but fortunately for her, the point of fixation and a small field round it has been preserved. The prognosis as to further improvement is bad.

Fuchs says: "Doses of 45 grains of quinine are very liable to cause this condition, and some cases have been known after a dose of 15 grains."

I presume that in this case there was a cumulative action.

Yours, etc.,

J. FRANK SPRING, M.D.,
Honorary Oculist, Saint Vincent's
Hospital, Melbourne, Victoria.

70, Collins Street,
Melbourne, C.I.,
June 18, 1934.

ACUTE ANTERIOR POLIOMYELITIS.

SIR: I consider that it will be most unwise to allow the case of "Acute Anterior Poliomyelitis" reported by Dr. Robert S. Irwin, in your issue of June 16, to pass without comment.

The question of treatment by means of convalescent serum is at present so important that every piece of evidence for or against must be examined with the utmost care. Only those cases can be accepted as benefiting from the serum where the evidence is perfectly unequivocal. One of the chief criticisms made against the use of con-

valescent serum is that many of the cases of the so-called pre-paralytic stage are in reality suffering from some entirely different condition, which would have recovered in any case without serum. Critics say that the favourable figures obtained by advocates of serum include various forms of cerebral inflammation and minor degrees of meningism due to entirely different causes.

Such, I consider, is unquestionably the attitude that would be taken up in this case with a very considerable measure of justice.

This subject began his illness on October 6 with a history of deafness and earache. Two days later he had a high temperature, increased deafness, and mastoid tenderness. In addition he had signs which are merely those of meningeal irritation and which are not in any way peculiar to infantile paralysis.

Lumbar puncture showed a cerebro-spinal fluid under considerably increased pressure, with a very slight cellular increase. Incision of the drums produced sanguineous fluid, and it was stated that there had been no purulent discharge from the ears. Dr. Irwin does not state whether there has been any discharge at all later.

It is a common enough matter in children with pharyngeal infective conditions to develop mild *otitis media* which does not come to active pus formation, but which at the same time may be quite sufficient to induce very definite cerebral signs from a simple meningism to an actual paralysis of the limbs.

I certainly consider that this possibility should be taken into account in recording the present case.

Yours, etc.,

S. F. McDONALD.

Craigston,
217, Wickham Terrace,
Brisbane,
June 19, 1934.

PRICES OF PROPRIETARY PREPARATIONS.

SIR: At a recent meeting of the Council attention was drawn to the increasing frequency with which members of the medical profession quote prices of ethical proprietary preparations to their patients.

In one case a suburban practitioner ordered two "Nembutal" tablets, costing the pharmacist 25s. for a bottle of fifty, and told the patient not to pay more than 9d. for each tablet. For a margin of 6d. on the transaction the chemist was expected to cover his overhead costs, break an original bottle, supply a container, label it, enter the prescription in the prescription book, mark the prescription, deliver the medicine, and verify the prescriber's signature.

Apart from the aspect mentioned above, most manufacturers who supply lists and catalogues to medical men quote wholesale prices in original containers. Prices also are so frequently altered by manufacturers that it is impossible for a medical man to keep in touch with such alterations and to know what are the correct prices to charge.

It makes it exceedingly difficult for a pharmacist to conduct his business without embarrassment when he is confronted with prices quoted by medical men to their patients, especially when such prices frequently mean supplying the medicine at a loss or, as often happens, the prices are quoted from a wholesale list.

The Council feels that on ethical grounds alone a medical man should not discuss the price of medicines with a patient, any more than a pharmacist should question a medical practitioner's fees.

May I, in conclusion, be permitted to quote the following extract from a letter dated June 18, 1934, from the Secretary of the Victorian Branch of the British Medical Association (Mr. C. Stanton Crouch):

I beg to inform you that your letter of 9th inst. has been considered by my Ethics Committee.

We sympathise with you in the action of some medical practitioners and recently we circularized our members requesting them not to quote the prices of drugs to their patients.

We think that the position would be met if you were to write a letter to the Editor of THE MEDICAL JOURNAL OF AUSTRALIA.

Yours, etc.,

C. L. BUTCHER,

Secretary,

Pharmaceutical Society of Victoria.

College of Pharmacy,
360, Swanston Street,
Melbourne, C.I.
June 20, 1934.

Proceedings of the Australian Medical Boards.

QUEENSLAND.

THE undermentioned have been registered, pursuant to the provisions of *The Medical Act of 1925*, of Queensland, as duly qualified medical practitioners:

Beveridge, Ruby Scoular, L.R.C.P. and S., 1923 (Edinburgh), L.R.F.P.S., 1923 (Glasgow), Rockhampton.
Birch, John Bright, M.B., B.S., 1915 (Univ. Adelaide), F.R.C.S., 1933 (Edinburgh), Coolangatta.
Machin, William Frederick, M.B., 1925 (Univ. Sydney), Clifton.

Turnbull, Reginald John David, M.B., B.S., 1933 (Univ. Melbourne), Brisbane.

Restoration to the Register:

Thomas, Edna Lyall, M.B., B.S., 1921 (Univ. Melbourne), Normanton.

NEW SOUTH WALES.

THE undermentioned have been registered, pursuant to the provisions of the *Medical Act, 1912 and 1915*, of New South Wales, as duly qualified medical practitioners:

Laurie, Elizabeth Frances Lois, M.B., B.S., 1933 (Univ. Sydney), Sydney Hospital, Sydney.

Paterson, Alexander Edgar, M.B., Ch.M., 1922 (Univ. Sydney).

TASMANIA.

THE undermentioned have been registered, pursuant to the provisions of the *Medical Act, 1918*, of Tasmania, as duly qualified medical practitioners:

Richmond, James Jackson, M.B., B.S., 1933 (Univ. Melbourne), Public Hospital, Launceston.

Hill, Nettie Grace, M.B., B.S., 1930 (Univ. Melbourne), Public Hospital, Launceston.

VICTORIA.

THE undermentioned have been registered, pursuant to the provisions of the *Medical Act, 1928*, of Victoria, as duly qualified medical practitioners:

Egan, John, M.B., Ch.B., 1923 (Ireland), D.P.H., 1929 (London), Federal Hotel, Collins Street, Melbourne, C.I.

Merlino, Giovanni, M.D., 1924 (Messina), 93, Delbridge Street, Fitzroy North, N.7.

- McNaughton, Alan Herbert, M.B., B.S., 1932 (Univ. Melbourne), Homœopathic Hospital, Melbourne, S.C.1.
 Tuddenham, Frederick Guy, M.B., B.S., 1934. (Univ. Melbourne), 4, Wallace Grove, Middle Brighton, S.5.
 Wilson, Basil Laun, M.B., Ch.B., 1924 (New Zealand), Eye and Ear Hospital, Melbourne, C.2.

Books Received.

- THE COMMON DISEASES OF THE SKIN: A HANDBOOK FOR STUDENTS AND MEDICAL PRACTITIONERS, by R. C. Low, M.D., F.R.C.P.: 1934. Edinburgh: Oliver and Boyd. Crown 8vo., pp. 331, with illustrations. Price: 12s. 6d. net.
 HOW IS YOUR DIGESTION? by E. Mellor: 1934. London: Methuen and Company, Limited. Foolscep 8vo., pp. 57. Price: 1s. net.
 CATECHISM SERIES: PHYSIOLOGY, Part I; Fourth Edition: 1934. Edinburgh: E. and S. Livingstone. Crown 8vo., pp. 86. Price: 1s. 6d. net.

Diary for the Month.

- JULY 10.—Tasmanian Branch, B.M.A.: Branch.
 JULY 10.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
 JULY 13.—Queensland Branch, B.M.A.: Council.
 JULY 17.—New South Wales Branch, B.M.A.: Ethics Committee.
 JULY 17.—Tasmanian Branch, B.M.A.: Council.
 JULY 18.—Western Australian Branch, B.M.A.: Branch.
 JULY 19.—New South Wales Branch, B.M.A.: Clinical Meeting.
 JULY 24.—New South Wales Branch, B.M.A.: Medical Politics Committee.
 JULY 26.—South Australian Branch, B.M.A.: Branch.
 JULY 26.—Victorian Branch, B.M.A.: Council.
 JULY 26.—New South Wales Branch, B.M.A.: Branch.
 JULY 27.—Queensland Branch, B.M.A.: Council.

Medical Appointments.

Dr. G. E. Aiken (B.M.A.) has been appointed a Member of the Mental Deficiency Board, Tasmania, for a period of three years.

Dr. C. N. Atkins (B.M.A.) has been appointed to act at the Port of Hobart, Tasmania, as Medical Inspector of Seamen, pursuant to the provisions of Section 123 of the Navigation Act, 1912-1926.

Dr. C. B. Carlin (B.M.A.) has been appointed Medical Officer of Health by the Goomalling Local Board of Health, Western Australia.

Medical Appointments Vacant, etc.

For announcements of medical appointments vacant, assistants, locum tenentes sought, etc., see "Advertiser," pages xvi, xvii and xviii.

- AUSTIN HOSPITAL FOR CANCER AND CHRONIC DISEASES, HEIDELBERG, VICTORIA: Resident Medical Officer.
 CHILDREN'S HOSPITAL (INCORPORATED), PERTH, WESTERN AUSTRALIA: Junior Resident Medical Officers.
 LAUNCESTON PUBLIC HOSPITAL, LAUNCESTON, TASMANIA: Resident Medical Officer.
 MATER MISERICORDIÆ CHILDREN'S HOSPITAL, BRISBANE, QUEENSLAND: Resident Medical Officer.
 ROYAL NORTH SHORE HOSPITAL OF SYDNEY, NEW SOUTH WALES: Medical Superintendent.
 SYDNEY HOSPITAL, SYDNEY, NEW SOUTH WALES: Honorary Relieving Assistant Surgeon.
 THE BRISBANE AND SOUTH COAST HOSPITALS BOARD, QUEENSLAND: Honorary Officers.
 THE WOMEN'S HOSPITAL, CROWN STREET, SYDNEY, NEW SOUTH WALES: Resident Medical Officers.
 TIDOOBURRA DISTRICT HOSPITAL, TIDOOBURRA, NEW SOUTH WALES: Resident Medical Officer.

Medical Appointments: Important Notice.

MEDICAL practitioners are requested not to apply for any appointment referred to in the following table without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, Tavistock Square London, W.C.1.

| BRANCH. | APPOINTMENTS. |
|---|---|
| | Australian Natives' Association. Ashfield and District United Friendly Societies' Dispensary. Balmain United Friendly Societies' Dispensary. Friendly Society Lodges at Casino. Leichhardt and Petersham United Friendly Societies' Dispensary. Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney. North Sydney Friendly Societies' Dispensary Limited. People's Prudential Assurance Company Limited. Phoenix Mutual Provident Society. |
| NEW SOUTH WALES: Honorary Secretary, 135, Macquarie Street, Sydney. | |
| VICTORIAN: Honorary Secretary, Medical Society Hall, East Melbourne. | All Institutes or Medical Dispensaries. Australian Prudential Association, Proprietary, Limited. Mutual National Provident Club. National Provident Association. Hospital or other appointments outside Victoria. |
| QUEENSLAND: Honorary Secretary, B.M.A. Building, Adelaide Street, Brisbane. | Brisbane Associated Friendly Societies' Medical Institute. Chillagoe Hospital. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL are advised, in their own interests, to submit a copy of their agreement to the Council before signing. Lower Burdekin District Hospital, Ayr. |
| SOUTH AUSTRALIAN: Secretary, 207, North Terrace, Adelaide. | Combined Friendly Societies, Clarendon and Kangarilla districts. Office of Health, District Council of Elliston. All Lodge Appointments in South Australia. All Contract Practice Appointments in South Australia. |
| WESTERN AUSTRALIAN: Honorary Secretary, 205, Saint George's Terrace, Perth. | All Contract Practice Appointments in Western Australia. |
| NEW ZEALAND (Wellington Division): Honorary Secretary, Wellington. | Friendly Society Lodges, Wellington, New Zealand. |

Editorial Notices.

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